

REPORT ON THE HYDROIDA COLLECTED BY THE
UNITED STATES FISHERIES STEAMER "ALBATROSS"
IN THE PHILIPPINE REGION, 1907-1910

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INTRODUCTION

The territory covered by the dredging stations worked by the United States Fisheries steamer *Albatross* during her Philippine cruise of 1907-1910 was somewhat more extensive than the Philippine region proper, extending from the most northerly station which was in the China Sea, vicinity of Hongkong, latitude $21^{\circ} 54' N.$, longitude $114^{\circ} 46' E.$, which is some 500 miles northwest of the Philippines proper; the vessel worked as far south as Borneo near Sudakan at about latitude $4^{\circ} 30' S.$, longitude $118^{\circ} E.$, which was also about the farthest west at which work seems to have been done and hydroids taken, with the exception of Hongkong. The extreme southern limit in the Philippines seems to have been at Tawi Tawi group of the Sulu Archipelago where stations were worked as far south as latitude $4^{\circ} 58' 20'' N.$, and the most southerly station of all yielding hydroids was in Macassar Strait, latitude $4^{\circ} 43' 22'' S.$ There was, therefore, a range of over 26° of latitude between the extreme northern and the extreme southern stations yielding hydroids.

It may be of interest to note the regions in which the most hydroids as indicated by the results of the dredging were found: China Sea, vicinity of Hongkong, at station 5310, five species were secured; at station 5311, six species; at station 5312, four species. In the Sulu Archipelago, vicinity of Siasi, hydroids were taken at all five hauls. Between Samar and Leyte, vicinity of Suriogo Strait, there were five hauls at which hydroids were taken.

The greatest depth represented by specimens in the collection was at station 5428, Eastern Palawan, 30th of June Island, N. 62° , W. 19.5° , depth 1,105 fathoms, where two species *Dictyocladium aberrans* and *Sertularella cornuta* were secured. *Stegopoma plicatile* was dredged from 441 fathoms at station 5529, $9^{\circ} 23' 45'' N.$, $123^{\circ} 39' 30'' E.$ *Zygophylax convallaria* came from a depth of 400 fathoms at station 5635, Pitt Passage, $10^{\circ} 53' 30'' S.$, $127^{\circ} 39' E.$;

and *Zygophylax curvitheca* was from 400 fathoms, station 5664. Macassar Strait, 4° 31' 22" S., 118° 53' 18" E. Nearly all of the other hydroids secured during this cruise were from depths of less than 200 fathoms and most of them from under 50 fathoms.

Hydroids were taken at 58 of the 575 dredging stations reported for the cruise, which does not indicate an extraordinarily rich hydroid fauna.

The author takes pleasure in expressing his great obligation to Warren Keck, research assistant in zoology in the University of Iowa, for very efficient aid in the preparation of this paper, whereby the writer has been relieved of most of the drudgery of looking up references, preparing specimens for examination, verifying data regarding dredging stations, and looking up the literature regarding previous work on the Hydroida. Much of the accuracy of the paper is due to the care and fidelity with which Mr. Keck has discharged his duties as research assistant. The plates accompanying this paper are from drawings by Mr. Keck.

In the matter of classification the writer adheres in the main, so far as the families Campanularidae, Sertularidae, and Plumularidae are concerned, to the scheme adopted in his American Hydroids, Parts I, II, and III, although he has used some of the genera instituted by Stechow and has added one new genus, *Stechowia*. Stechow¹ has worked out an elaborate revision of the classification of the Hydroida in which he has divided the family Sertularidae into three new subfamilies, Thyroscyphinae, Sertomminae, and Sertularinae, largely on the basis of the presence or absence of an abcauline blind-sack in combination with certain characters of the hydrothecal margin. He recognizes 36 genera in this family of which 14 are new. He also reduces to synonymy a large number of generic names that have been established and almost universally used for generations, such as *Thuiaria*, *Desmoscyphus*, and *Monopoma*.

While I do not propose to enter into an adequate discussion of Doctor Stechow's work, I will say that it seems to me that some of his genera are based on characters that are not of generic rank, and in his new genus *Tridentata*, 1920, he has included a large number of heterogeneous forms that, in my opinion, are generically separate. In this single genus he has placed together species formerly belonging to the well-established genera, *Sertularia*, *Dynamena*, *Desmoscyphus*, *Thuiaria*, all of which seem to me to have generic rank. He places this heterogeneous lot under one genus because they have two lateral hydrothecal teeth and a small adcauline median tooth, together with a two-flapped operculum. The old genus, *Sertularia*, is practically identical with his *Tridentata* except in the possession

¹Zur Kenntnis der Hydroidenfauna des Mittelmeeres, etc., Parts I and II, 1919-1923.

of the small median hydrothecal tooth. This is so rudimentary that it has not affected the operculum, as in the case of truly tridentate forms such as found in the genus *Sertularella*, but his genus *Tridentata* has a two-flapped operculum such as is common in *Sertularia*. This seems to me to be a character not of generic value and I also believe that such a procedure tends to confuse rather than to simplify the situation.

Doctor Stechow is a very thorough and conscientious student of the Hydroida and his activity for the last few years has probably not been surpassed by any other worker in that group; but his multiplication of names and breaking up of old genera and recombination into new genera of the fragments of the old all tend, in my opinion, to confuse the situation. It is a deplorable fact that the systematists have fallen into more or less disrepute in the estimation of the morphologists and workers in other zoological fields on account of their continual rearrangement and disturbance of classification. This causes constant irritation, indeed exasperation, in the minds of those who are working in the general field, for the simple reason that it seems to them that there is no such thing as stability of names in zoology, although that has really been the aim of the systematists for many years. Doctor Stechow has made an earnest effort to comply with the rules of the International Commission on nomenclature, but even here he, in common with most European writers, does not adopt the rule that a species named after a person or a country should not be capitalized.

In his discussion of the Plumularidae, Doctor Stechow again divides the family into three subfamilies, Kirchenpauerinae, Plumularinae, and Aglaopheninae, based on the characters of the nematophores which are one-chambered in the first, free and two-chambered in the second, and fixed and two-chambered in the third. He recognizes a total of 44 genera, of which 12 are new.

Bedot² has undertaken a thorough systematic revision of the family Plumularidae. He does not recognize the subfamilies of Stechow and includes 32 genera in his discussion. He discards the genera *Antomma*, *Dentitheca*, *Plumella*, *Oswaldella*, *Pycnotheca*, and *Lytocarpia*; thus he declines to recognize exactly half of the new genera described by Stechow. This looks almost like a repercussion of the late war.

The present writer is not prepared to enter fully into this discussion, neither is this paper one in which it should figure. He must confess, however, a preference for a conservative course in nomenclature and is much averse to the abandoning of established genera or the formation of new ones unless such a course is rendered inev-

² Notes systématiques sur les Plumularides, two parts, 1921.

itable by situations so clear that an old genus is untenable or a new one practically unavoidable.

Among the most recent discussions of the classification of the Hydroida is that of Billard.³ Billard somewhat severely criticizes Stechow's work, introducing his discussion as follows: "Depuis les travaux de Broch, un auteur allemand, Stechow, a compliqué les choses en créant de nouveaux genres, en débaptisant et rebaptisant certains genres, et ce d'une façon qui n'a pas toujours été heureuse et judicieuse."

He discards Stechow's genera *Dymella*, *Sertaria*, *Pasya*, *Tridentata*, *Lagenitheca*, *Nigella*, and indicates the doubtful validity of other genera established by that writer.

With such differences of opinion between authors of recognized authority it seems best to steer a conservative course. In this the present writer finds himself more in agreement with Bedot and Billard than with his distinguished colleague, Stechow. It seems that this conservative course is less likely to add to the confusion that prevails in our literature dealing with the classification of the Hydroida than would follow the adoption of the great number of nomenclatural changes instituted by Stechow.

SYSTEMATIC REVIEW OF THE HYDROIDS

[The asterisk (*) indicates a new species. The double asterisk (**) indicates a new genus, while the dagger (†) indicates species in which the gonosome is first described in this paper.]

Gymnoblasic forms:

TUBULARIDAE.

Brauchiocerianthus imperator. Japan.

EUDENDRIDAE.

Eudendrium capillare.

Calypteroblastic forms:

HALECIDAE.

Halecium lighti.

CAMPANULARIDAE.

**Obelia thornelyi*.

Thyroscyphus marginatus.

CAMPANULINIDAE.

Stegopoma plicatile.

Stegopoma gracilis.

**Stegopoma dimorpha*.

HEBELLIDAE.

Hebella contorta.

Hebella neglecta.

**Hebella spiralis*.

³ Note critique sur divers genres et espèces d'Hydroïdes, Revue Suisse de Zoologie, vol. 31, No. 2, May, 1924.

LAFOËIDAE.

- **Acryptolaria normani*.
- Acryptolaria pulchella*.
- Zygophylax rufa*.
- Zygophylax convallaria*.
- Zygophylax curvitheca*.

SERTULARIDAE.

- Sertularia divergens*.
- Thuaria quadridens*.
- **Dictyocladium abcrans*.
- Sertularella cornuta*.
- †*Sertularella mirabilis*.
- Sertularella philippinensis*.
- Idia pristis*.
- Diphasia digitalis*.
- †*Diphasia huerteli*.
- **Diphasia inornata*.
- Pasythea quadridentata*.

SYNTHECIDAE.

- Syntheceum tubithecum*.

PLUMULARIDAE.

Eleutheroplean forms—

- Plumularia buskii*.
- †*Plumularia aglaophenoides*.
- **Plumularia flabellata*.
- **Plumularia hargitti*.
- Plumularia dendritica*.
- **Plumularia camarata*.
- **Antennella biarmata*.
- **Antennella recta*.
- Nemertesia cylindrica*.
- **Antennopsis pacifica*.
- †*Acanthella effusa*.
- ***Stechowia armata*.

Statoplean forms:

- Aglaophenia macgillivrayi*.
- Aglaophenia calycifera*.
- Aglaophenia urens*.
- Aglaophenia divaricata*.
- **Aglaophenia triramosa*.
- Lytocarpus phoeniceus*.
- Lytocarpus spectabilis*.
- Lytocarpus pennarius*.
- Lytocarpus philippinus*.
- Lytocarpus balei*.
- **Thecocarpus balei*.
- Halicornaria hians*.
- **Halicornaria tenuirostris*.
- **Halicornaria magnirostris*.

This table indicates that the specimens of hydroids in this collection represents 10 families, 27 genera, and 54 species. It includes 1 new genus, 17 new species, and 4 gonosomes not hitherto described

and affords many new records of species not hitherto found in the Philippine region, thus increasing the known range of such forms.

One interesting feature of the collection is the relative scarcity of gymnoblastic forms, there being but three species belonging to this group, and one of these, *Branchiocerianthus imperator*, was dredged in Japanese waters and does not belong properly in this collection. On the other hand, 26 species, almost one-half of the total, belong to the one family, Plumularidae, and this family was divided almost equally between the eleutheroplean and statoplean forms, there being 12 of the former and 14 of the latter.

It is interesting to compare the general facies of this collection with that reported on by Doctor Hargitt,⁴ which contained about 50 species, 13 of which were gymnoblastic and the remainder calyptero-blastic forms and among the latter were but 7 species belonging to the family Plumularidae. This difference is doubtless due in part to the greater average depth of the stations worked by the *Albatross*, the Plumularidae usually thriving best in rather deep water. But the difference in the number of gymnoblastic forms represented in the two collections is hard to explain, although it may be due to a good deal of shore or tide-pool collecting in the case of the material reported on by Doctor Hargitt.

Family TUBULARIDAE

BRANCHIOCERIANTHUS IMPERATOR (Allman)

Monacaulus imperator ALLMAN, Challenger Reports, the Hydroida, pt. 2, 1888, p. 5.

The specimen secured by the *Albatross* is much smaller than those heretofore reported, but I find no good specific differences. The hydrocaulus is but 26 cm. long to the base of the hydranth. Height of hydranth 2 cm. and diameter 8 mm. One of the outstretched tentacles measures $7\frac{1}{2}$ cm. in length. Compared with the enormous dimensions of the type specimen as recorded by Allman—hydranth $1\frac{1}{2}$ inches, tentacles 4 inches long, with a stem 7 feet 4 inches high—the present specimen is relatively small, although it bears sexually mature gonophores.

The excellent descriptions and figures given by Stechow⁵ agree very well with the specimen at hand except in size, his figure indicating a length of hydrocaulus of 85 cm.

In structure and characters of the proximal end of the hydrocaulus the *Albatross* specimen agrees very closely with that described by Stechow. The hydranth has been badly mutilated presumably by the dredge or trawl and the bilateral symmetry which Stechow

⁴ Hydroids of the Philippine Islands, 1924.

⁵ Beiträge zur Kenntnis von *Branchiocerianthus imperator*, München, 1908.

gives as a character of this species is not evident. Allman, to be sure, did not mention this feature, neither is it indicated in his figures, but Mark, in 1898, studied the type specimen in the British Museum and noted its tendency toward bilateral symmetry.

The proboscis with the distal set of tentacles was torn off, but appears as a large fragment in the bottle containing the specimen and this fragment doubtless belong to the same specimen. The gonophores are much as described by Stechow, the older ones being generally ovate in form while the immature ones have a triangular profile as represented by him such as I have not seen in other species.

Locality.—Dredging station 4920, Musakaki Jima, N. 10° E., 17.5 miles ($30^{\circ} 34' N.$; $129^{\circ} 22' E.$); depth, 440 fathoms.

Distribution.—The type specimen was found off Yokohama, Japan, at the great depth of 2,900 fathoms, and other specimens are mentioned by Stechow from Sagami Bay, Japan. Some of the specimens reported by him come from a depth of only 250 fathoms. Although this specimen was accidentally included in the *Albatross* material from the Philippine Islands, it seems to me that this brief note of it can occur here with the understanding that it is not as yet known from the Philippine Islands.

Family EUDENDRIDAE

EUDENDRIUM CAPILLARE Alder

Eudendrium capillare ALDER, Cat. Zooph. Northumb. and Durham, 1857, p. 15, pl. 1, figs. 9-12.

The soft parts of the specimens secured by the *Albatross* are so matted together that details can hardly be ascertained. The following points, however, can be made out fairly well.

Trophosome.—Colony about 3 cm. high. Branches irregular, smooth for the most part, but often with about three annulations above their origin. Other branchlets or pedicels are often alternate, but not always so. Main stem quite smooth. The hydranth has the characteristic trumpet-shaped proboscis of the Eudendridae. The tentacles are all filiform and arranged in a single whorl around the base of the hydranth. They are quite numerous, at least 26 being counted in one case.

Gonosome.—Gonophores borne in clusters on the pedicels beneath the hydranths, the latter being sometimes more or less aborted. Both sexes appear on the same colony and in one case a cluster of male gonophores were on one side of a branch and one of female gonophores on the other. Both are of the characteristic *Eudendrium* type. The male gonophores are bithalamic in the single cluster found and thus agree with the original description of this species.

Locality.—Dredging station 5174, latitude N. $6^{\circ} 03' 45''$, longitude E. $120^{\circ} 57'$, off Jolo light 2.6 miles; depth, 20 fathoms.

Distribution.—British Isles (Alder, Allman); Woods Hole, Mass. (Nutting); San Juan Archipelago (Fraser); Hawaii (Nutting); Japan (Stechow).

It seems to me likely that the *E. attenuatum* reported from the Philippines by Hargitt belongs to this species.⁶

Family HALECIDAE

?*HALECIUM LIGHTI* Hargitt

Halecium lighti HARGITT, Hydroids of the Philippine Islands, Philippine Journal of Science, vol. 24, No. 4, April, 1924, p. 489, pl. 4, fig. 13.

A fragmentary specimen which has evidently dried and is without recognizable soft parts is referred with doubt to this species. The stem is fascicled, as is very common in this genus; the branches are usually subalternate and regularly divided into internodes, each of which bears a sessile hydrophore much as figured by Hargitt so far as general shape is concerned. Contrary to his description, the series of "punctae" or round dots which encircle the hydrophore just below the margin is quite evident in the *Albatross* specimen.

Hargitt failed to find the "pair of extra large tentacles, some of which seemed to be armed with especially large nematocysts," which Light regarded as a specific character. He (Hargitt) says: "This detail of his description proved to be only partly true, large numbers of hydranths being entirely devoid of these specialized tentacles, some having but one, thus rendering the specific designation proposed very doubtful and even misleading." In his figure Hargitt represents the hydranths as being of the ordinary type for Halecidae. If these extraordinary tentacles are actually present the species should be made a basis for the description of a new genus.

In the absence of the gonosome the specific identity of this form seems to me to be extremely dubious. It is very much like *Halecium sessile* Norman as figured by Stechow.⁷

Locality.—Station 5149, off Sirun Island, 5° 33' N., 120° 42' 10" E.; depth, 10 fathoms.

Distribution.—Port Galera Bay, Mindoro, "growing in strong currents flowing in and out of the bay" (Hargitt).

Family CAMPANULARIDAE

OBELIA THORNELYI, new species

Obelia serrulata (Bale) THORNELY, The Hydroid Zoophytes collected by Doctor Willey in the Southern Seas. Willey's Zoological Results, pt. 4, Cambridge Univ. Press, 1899, p. 453, pl. 44, fig. 5.

I do not consider Miss Thornely correct in ascribing the species referred to above to the *O. serrulata* of Bale. The original descrip-

⁶ The Philippine Journal of Science, vol. 24, No. 4, 1924, p. 474.

⁷ Hydroidpolyphen der japanischen Ostküste, pt. 2, 1913, p. 86, fig. 54.

tion seems to me to refer to quite a different form.⁸ Bale's description is as follows: "Hydrorhiza, slender, climbing, hydrothecae borne on long peduncles which spring either directly from other hydrorhiza or from the side of other peduncles; peduncles slender, with about 8-16 rings at the base and a less number (mostly two or three) at the summit, smooth throughout the rest of their length. Hydrothecae large, campanulate, constricted at the 'floor' which is raised above the base so as to inclose a nearly cylindrical cavity; margin, not expanding; armed with 10-14 rather large triangular-pointed teeth.

"This is a delicate species with no proper stem, but the primary peduncles generally give origin to secondary ones exactly resembling them."

Miss Thornely, on the contrary, says that her specimen "is branched and has a straight compound stem formed by the downward growth of the peduncles of the hydrothecae."

As a matter of fact, this is a very common state of affairs as I have already shown.⁹

Locality.—Dredging station 5254, Gulf of Davao, off Linao Point, 7° 05' 42" N., 125° 39' 42" E.; depth, 21 fathoms.

Holotype.—Cat. No. 42173, U.S.N.M.

Distribution.—Blanche Bay, New Britain, 40 fathoms (Thornely).

THYROSCYPHUS MARGINATUS (Bale) not Allman

Campanularia marginata BALE. Catalogue of Australian Hydroid Zoophytes, 1884, p. 54.

Thyroscyphus marginatus BALE, Trans. and Proc. Royal Society of Victoria, 1914, new ser., vol. 27, p. 91.

Only a fragmentary specimen was found in the *Albatross* material. Fortunately, however, the peculiar squarish and four-toothed margin with its double border makes it reasonably certain that we have this species to deal with. After originally placing it in the genus *Campanularia*, Bale, the describer, placed it in the genus *Thyroscyphus*, a genus of Campanularidae, doubtless on account of its operculum, which he mentions indeed in the original description of 1884. So far as the present writer can ascertain, this species has hitherto been reported from Australian waters only, so that the specimen secured by the *Albatross* affords the first record from the Philippines.

As this form has never been adequately described, the following description is appended:

The largest fragment secured by the *Albatross* is 4½ cm. in height and the hydrorhiza is absent. The main stem is monosi-

⁸ Some New and Rare Hydroida in the Australian Museum Collection, Proceedings of the Linnean Society, New South Wales, vol. 3, ser. 2, 1888, p. 757, pl. 12, fig. 4.

⁹ See American Hydroids, pt. 2, 1904, p. 6, and pt. 3, p. 4.

phonic, fairly straight, without evident internodes, and reddish brown in color. The pinnae are also without evident internodes and are subalternate in position. Hydrothecae borne on main stem and pinnae and on very short pedicels, so short that the hydrothecae often appear to be sessile. Hydrothecae made of rather dense chitin, bell shaped, with a squarish margin which has two annular markings just below it. There are four large quite evident marginal teeth, as in many species of the genus *Sertularella*. In some cases the four-flapped operculum is quite distinct.

Gonosome.—Unknown.

Locality.—Dredging station 5149. Sulu Archipelago, vicinity of Sirun Island, 5° 33' N., 120° 42' 10'' E.; depth, 10 fathoms.

So far as the hydrothecae are concerned, this species comes very near *Sertularella*, the well-known Sertularian genus, and it may finally be placed there when the gonosome and soft parts are known.

Distribution.—Australia (Bale, Stechow).

Family CAMPANULINIDAE

STEGOPOMA PLICATILE (M. Sars)

Lafoca plicatilis Sars, Vidensk. Selsk. Forhandl., Christiania, 1862, p. 31.

Calycella plicatilis G. O. Sars, Vidensk. Selsk. Forhandl., Christiania, 1862, p. 117.

Stegopoma plicatile LEVINSSEN, Meduser, Ctenophorer og Hydroider fra Grönlands Vestkyst, 1893, p. 36, pl. 6, figs. 1-7.

The best description and figures of this species that I have been able to find are by Levinsen in the last paper referred to above. Although M. Sars gives a fairly good figure which shows the characteristic features well. As I have not found a complete description of this species, it seems advisable to insert the following:

Trophosome.—Colony 8 cm. in height and with a spread of 4 cm. Stem and larger branches fascicled and bearing irregularly scattered hydrothecae between the branch origins. Ultimate branches simple and alternate. Hydrothecae sessile or even slightly immersed on main stem and branches and alternate on ultimate branches, standing at an acute angle with the stem or branch and considerably smaller than those of other species, being usually less than a mm. in height and practically sessile, each being borne on a shoulder of the branch. They are subtubular in shape, increasing gradually in diameter toward the aperture. Operculum much as in other species of this genus consisting of two pleated flaps like the roof of an "A" tent; there is a distinct diaphragm.

Gonosome.—Missing in the material secured by the *Albatross*, but according to Levinsen the gonangia are borne on the stem and main branches near the branch origins, are greatly elongated sacklike

affairs lying almost parallel to the branches near the bases of which they arise.

Locality.—Dredging station 5529, between Siquijor and Bohol Islands, off Balicasag Island, $9^{\circ} 23' 45''$ N., $123^{\circ} 39' 30''$ E.; depth, 441 fathoms.

Distribution.—Norway (Sars), Greenland (Levinsen), Spitzbergen (Jäderholm), Kara Sea (Jäderholm), North Sea (Broch), Barents Sea (Thompson), Siberian Polar Sea (Jäderholm), Bering Sea (Jäderholm), East Coast United States (Verrill), Coast of Japan (von Marenzeller).

So far as the present writer knows, this is the first report of *S. plicatile* from Philippine waters.

STEGOPOMA GRACILIS Nutting

Stegopoma gracilis NUTTING, Hydroids of the Hawaiian Islands collected by the Steamer "Albatross" in 1902, U. S. F. C. Bulletin for 1903, pt. 3, 1905, p. 944.

Stegopoma medusiformis HARGITT, Hydroids of the Philippine Islands, 1924, p. 491, pl. 4, fig. 15.

Dr. Charles Hargitt in his paper on Hydroids of the Philippine Islands, (1924, p. 491) describes a new species which he calls *Stegopoma medusiformis*. In the synonymy following the name he mentions *Campanularia fastigiata* Alder, *Calycella fastigiata* Hincks, and *Stegopoma gracilis* Nutting. It is difficult for the present writer to understand why, if these are synonyms for his new species, *S. medusiformis*, he gives them another name. Bestowing a new name on a previously described species is only justified when the old name can be properly outlawed by virtue of the application of one of the well-known laws of nomenclature. Hargitt makes no attempt to justify his ignoring these names which he lists as synonyms. As a matter of fact, I can not see that either of the names that he gives is a synonym of his form, as a little study of *Campanularia fastigiata* Alder and of *Stegopoma gracilis* Nutting shows; the former having a distinctly fascicled stem and the latter having much smaller gonangia as compared with the hydrothecae than Hargitt's species.

But in completing his discussion of his *S. medusiformis* Hargitt says: "In general the species here described agrees very well with those referred to above, but it agrees more closely with that of Nutting, *Stegopoma gracilis*; yet there appear features which differ from it. I am disposed to suggest that on the basis of the distinctive medusoid characters and the larger size of the gonangia it be designated as a new species."

In other words, Hargitt first names *S. medusiformis* definitely as a new species; then he regards *S. fastigiata* and *S. gracilis* as syno-

nymys, thus indicating that his form is not new and lastly he is "disposed to suggest" that it be designated as a new species. I can see no essential difference between *Stegopoma gracilis* and *medusiformis* and have therefore listed the latter as a synonym.

Localities.—Dredging station 5168, Sulu Archipelago, Tawi Tawi group, Observation Id., 4° 56' 30'' N., 119° 45' 40'' E.; depth, 80 fathoms. Station 5413, between Cebu and Bohol near Lauis Point, 10° 10' 35'' N., 124° 3' 15'' E.; depth, 42 fathoms. Growing on *Acryptolaria normani*, a new species presently to be described.

STEGOPOMA DIMORPHA, new species

Plate 40, figs. 1, 2, 3

Trophosome.—Colony not parasitic as in other species of the genus but branching in form and attaining a total height of 9 cm. Stem and main branches fascicled much as in *S. fasciata* (Johnston). Main branches irregularly disposed, but the ultimate branches are not fascicled and are quite irregularly alternate, with rarely somewhat indefinite nodes, and often annulated proximally. Pedicels of varying length, some being longer than the hydrothecae and others quite short so that the hydrothecae are practically sessile, but not actually so. The pedicels may be ringed or annulated throughout, quite smooth throughout, annulated proximally or annulated distally; but this latter condition is quite rare. Hydrothecae very large, tubular, slender, measuring as much as two mm. in length and 0.5 mm. in diameter. The margin is beveled on two sides so that the pleated operculum is in the shape of an "A" tent, a character of the genus. There is an evident diaphragm near the bottom of the hydrotheca.

Hydranths.—Well shown in the specimen described. The proboscis is not strictly conical as is usual in the genus, but approaches the trumpet shape of the Campanularidae, being often wider at its distal end, although it does not have the outward curve of the typical campanularian. There are usually about 16 tentacles, although these vary considerably in number.

Gonosome.—Gonangia about the same size as the hydrothecae and much the same shape, almost sessile, walls very delicate and transparent, so that the structure of the operculum is hard to make out, but it is of the "A" tent type. The blastostyle bears seven developing medusae in fully formed examples. The sex products are not developed sufficiently to disclose ova or spermatozoa. This type of gonangium is usually borne on the ultimate branches and not on the main stem or larger fascicled branches. The second type of gonan-

gia, on the same colony as the others, is borne on the main fascicled stem. They are very much larger than the first kind, one of them measuring 3.1 mm. in length and 1 mm. in diameter. The walls are also much thicker and distinctly brownish yellow in color, like the thick chitin of the fascicled stem. They are considerably flattened distally and the "A" of the operculum is sharply pointed. Their contents are not sufficiently well preserved for description, but they have the appearance of containing old blastostyles from which the contents have escaped. One of these gonangia bears gonads which appear to be male and show no medusoid characters whatever. The two kinds of gonangia do not appear to intergrade, although each varies considerably in size.

This curious dimorphism of the gonangia has not been described before, so far as I know, in the Campanulinidae, nor indeed have I encountered it in the hydroids. Of course, there are forms with colonies bearing both male and female gonads, but I have not seen such a striking difference in the gonangia of a single colony.

Locality.—The holotype, Cat. No. 42174, U.S.N.M., was dredged at station 5117, Balayan Bay and Verde Island Passage near Sombrero Island, 13° 52' 22" N., 120° 46' 22" E.; depth, 118 fathoms. This remarkable form is nearest to my *Stegopoma gilberti*¹⁰ from which it differs in having many of the pedicels extensively annulated, in the shape of the proboscis, and in the two kinds of gonangia many of which are much larger than the hydrothecae instead of usually being shorter as in *S. gilberti*.

Family HEBELLIDAE

HEBELLA CONTORTA Marktanner-Turneretscher

Hebella contorta MARKTANNER-TURNERETSCHER. Die Hydroiden des k. k. naturhistorischen Hofmuseums, 1890, p. 215.

This species is reported by the original describer and also by Doctor Hargitt as occurring on *Idia pristis*, and is parasitic on that species in the *Albatross* material which forms the basis for this paper. The hydrothecae vary greatly, sometimes being almost straight cylinders, but many having the twisted appearance reported and figured by Marktanner-Turneretscher.

Locality.—Dredging station 5146, Sulu Archipelago near Sulade Island, 5° 46' 40" N., 120° 48' 50" E.; depth, 24 fathoms.

Distribution.—Type from Singapore Museum. Reported from Philippines also by Doctor Hargitt.

¹⁰Hydroids of the Hawaiian Islands, U. S. Fish Commission Bulletin for 1903, pt. 3, p. 943, Dec. 23, 1905.

HEBELLA NEGLECTA Stechow

Hebella neglecta STECHOW, Zur Kenninis neuer oder seltener Hydroid-polypen, etc., 1914, p. 139.

Our specimens answer very well to Stechow's description and figures, having large cylindrical hydrothecae with everted rim and noncorrugated walls. The pedicels are short and not annulated.

Gonosome.—Not known.

Locality.—Dredging station 5413, between Cebu and Bohol, near Lais Point, 10° 10' 35" N., 124° 3' 15" E.; depth, 42 fathoms. Growing on *Acryptolaria normani*.

Distribution.—Uruga Kanal, Japan (Stechow).

HEBELLA SPIRALIS, new species

Plate 40, figs. 4, 5, 6

Colony parasitic, growing as a creeping root stalk over a large pinnate sertularian hydroid, completely invading all its stem and branches.

Trophosome.—Hydrocaulus simple, sinuous in its course, and sending off usually alternate hydrothecae. On the main stem of the host this parasitic root stalk forms an intricate network of delicate often anastomosing pattern. Hydrothecae irregularly scattered on the main stem of the host but tending to be opposite on the pinnae, although this feature is by no means constant. The hydrothecae are in the form of spirally twisted tubes, in some cases there being about one and one-half turns to the spiral, and there is great variation in the closeness of the twist, some being rather tightly coiled and others drawn out into a very loose spiral. The aperture is normally round and the rim even. There is sometimes, not by any means always, a thickening of the rim and a small but evident diaphragm at the bottom of the hydrotheca separating its cavity from that of the pedicel. Pedicel very short and broad, but evident. Owing to the torsion of the hydrothecae the pedicel is hard to see under ordinary circumstances. When the root stalk from which they spring is on the upper surface of a pinna the hydrothecae are twisted around so as to face downward.

Locality.—Dredging station 5477, between Samar and Leyte, vicinity of Surigao Strait, Taebuc Point, 10° 44' 45" N., 125° 12' 30" E.; depth, 48 fathoms.

Holotype.—Cat. No. 42175, U.S.N.M. This form is nearest to *Hebella contorta* Marktanner-Turneretscher¹¹ from Singapore, from which it differs in a much greater torsion of the hydrothecae, which, according to the figures given by the describer, are but slightly twisted, not curved in a spiral as those of *H. spiralis*.

¹¹ Die Hydroïden des k. k. naturhistorischen Hofmuseums, Vienna, 1890, p. 215.

This species is remarkable for the pronounced torsion of its hydrothecae. The extent of the colony, if it is a single colony is enormous, as it spreads over the entire surface of stem and branches of a plume-like sertularian 18 cm. in height, and there must be many thousands of the hydrothecae.

Family LAFOËIDAE

ACRYPTOLARIA NORMANI, new species

Plate 41, figs. 1, 2

Trophosome.—Colony pinnate, $4\frac{1}{2}$ cm. high and with a spread of $11\frac{1}{2}$ cm. Stem and branches, except at their distal ends, fascicled and consisting of a central hydrothecate tube surrounded by a number of others destitute of hydrothecae. Branches subalternate, on opposite sides of the stem, projecting from the stem almost at right angles. Those near the proximal end of the colony are fascicled almost to their tips, while those at the distal end are simple, almost throughout and without evident nodes. Hydrothecae on the main stem are usually more or less immersed, two of them being found between two adjacent branch bases. Those on the branches are alternate and on opposite sides, adnate to the branch for most of their length up to the bend, but those on the tips of the colony are free for a considerable part of their length. The hydrothecae are tubular but abruptly bent outward near their distal ends so that their apertures are at right angles to the main body or even face slightly downward, on the under side is a bend at a right angle or even a reentrant curve. The rim is ornamented by two, sometimes three, circular ridges which are quite conspicuous. There is a distinct diaphragm near the bottom of the hydrotheca and the hydrothecae taper gradually into the tube from which they spring.

Nematophores.—There are a few nematophores irregularly scattered over the branches but they seem to have no very constant relation to the hydrothecae.

Gonosome.—Gonangia cylindrical about as high as the hydrothecae but almost three times as broad, being three-fifths as wide as high. Basal part curving roundly to the stem on which it appears to be sessile. Only three were found and one was on the proximal part of the stem. It is barely possible that these belong to a parasitic hydroid, several of which were found on the specimen studied, but they appear to be organically connected with the colony of *A. normani*.

The presence of nematophores on this form is quite confusing and tends to show that their systematic importance is not great.

Localities.—This species was secured by the *Albatross* at dredging station 5413, between Cebu and Bohol, at Luis Point, $10^{\circ} 10' 35''$ N.,

124° 3' 15'' E.; depth, 42 fathoms. Station 5355, North Balabac Strait, Balabac Light, 8° 8' 10'' N., 117° 19' 15'' E.; depth, 44 fathoms.

The holotype from station 5413 bears Catalogue No. 42176, U.S.N.M.

ACRYPTOLARIA PULCHELLA (Allman)

Cryptolaria pulchella ALLMAN, Challenger Reports, the Hydroida, Part 2, 1888, p. 40.

Cryptolaria pulchella STECHOW, Hydroidpolyphen der japanischen Ostküste, Part 2, 1913, p. 112.

This species should be placed in Norman's genus *Acryptolaria* after the scheme adopted by Stechow.¹² The specimens secured by the *Albatross* show great variation in the hydrothecae, particularly in the distance between adjacent ones, but many are quite typical of the species as described by Allman and the present writer.

Gonosome.—Not present in the specimen secured.

Locality.—Dredging station 5168, Sulu Archipelago, Tawi-Tawi group, Observation Island, 4° 56' 30'' N., 119° 45' 40'' E.; depth, 80 fathoms.

Distribution.—Hawaiian Islands (Allman, Nutting), where it is a very abundant form; Japan (Stechow); Pacific coast off Panama (Clarke).

ZYGOPHYLAX RUFA (Bale)

Campanularia rufa BALE, Catalogue of the Australian Hydroid Zoophytes, 1884, p. 54, pl. 1, fig. 1.

Zygophylax rufa (BALE), Proc. Royal Society of Victoria, vol. 27, new ser., pt. 1, 1914, p. 90.

As this appears to be the first report of this species from the Philippines and as references to it are few and the original description rather scant, the following fuller description may be serviceable:

Trophosome.—Colony 7 cm. high, spread 7½ cm., flabellate in form. Main stem quite straight, fascicled, apparently without internodes and bearing an occasional hydrotheca; color, reddish or orange brown. Branches on opposite sides of the stem, subalternate, the main ones fascicled and colored like the stem. Pinnae on opposite sides of the stem and branches, subalternate in arrangement, not ordinarily divided into internodes and quite straight. Hydrothecae subcylindrical, 0.75 mm. high, 0.48 mm. in diameter. They are quite rigid, the inner side somewhat curved proximally while the outer side is nearly straight; margin, perfectly smooth, circular, with a fine annular line or marking just below. Pedicels usually of a single internode or rarely of two small ones, internodes often more or less

¹² Zur Kenntnis der Hydroidenfauna des Mittelmeeres, Amerikas und anderer Gebiete, pt. 2, 1923, p. 137.

oblique. The pedicel is borne on a short shoulder-like projection of the branch or pinna. Hydranths, not sufficiently well preserved for description, but apparently of the ordinary campanularian type.

Gonosome.—Not known.

Localities.—Dredging station 5149, Sulu Archipelago, vicinity of Siasi, 5° 33' N., 120° 42' 10'' E.; depth, 10 fathoms. Station 5310, China Sea, vicinity of Hongkong, 21° 33' N., 116° 13' E.; depth, 100 fathoms.

Distribution.—Bale reports it from Holbrun Island 20 fathoms (Mr. Haswell). G. Conrad Bartlett published a list of species, including *Campanularia rufa*, in the Geelong Naturalist (No. 35, April, 1907, p. 41), but does not give the localities at which the specimens were collected.

This species differs from *C. marginata* Allman in having a fascicled stem and from *C. subrufa* Jäderholm in the general absence of nodes on the pinnae or ultimate branches.

ZYGOPHYLAX CONVALLARIA (Allman)

Lafoëa convallaria ALLMAN, *Hydroida of the Gulf Stream*, 1877, p. 12.

So far as I can ascertain this is the first time this very beautiful hydroid has been reported since it was originally described by Allman. As several additional characters are shown in the specimens collected by the *Albatross*, the following description is offered.

Trophosome.—Colony 10 cm. in height and with a spread of about 7 cm. Stem and main branches fascicled. At or near the bases of the stem and larger branches a number of delicately branched structures appear which are probably phylactogonial in their nature. There are also scattered very slender, tubular offshoots that are probably elongated nematophores. Main branches subalternate or opposite. Ultimate branches subalternate and not divided into internodes. Hydrothecae all on one side of the ultimate branchlets but inclined alternately to right and left, very gracefully curved upward and outward from their pedicels, the curve being much like that of a sickle, forming one of the most graceful hydrothecae that the writer has ever seen. They are somewhat swollen at the base and narrow distally, ending in an even circular margin which is sometimes reduplicated. There are usually two hydrothecae on the main branch between adjacent alternate branchlets. The pedicels vary greatly in length, the hydrothecae on the main stem and proximal parts of the main branches being almost sessile, while those on the ultimate branches often have pedicels almost or quite as long as the hydrothecae. Nematophores are small, inconspicuous, and sparsely distributed. They have a tendency to occupy a position on the pedicels on stem near the base of the hydrothecae.

Gonosome.—Not known, but the branch structures referred to above probably indicate that there is a coppinia mass similar to that of *Lictorella cervicornis* Nutting.¹³

Locality.—Dredging station 5635, Pitt Passage at Gomomo Island. 1° 53' 30'' S., 127° 39' E.; depth, 400 fathoms.

Distribution.—The type was taken off Florida reef from a depth of 152 fathoms. This species is nearest *Lictorella cervicornis* Nutting, from which it differs in the curvature of the hydrothecae and their lateral position. It differs from *Zygophylax curvitheca* Stechow in having the hydrothecae bent but not twisted and in the much longer pedicels.

ZYGOPHYLAX CURVITHECA Stechow

Plate 41, fig. 3

Zygophylax curvitheca STECHOW, Neue Genera thecates Hydroiden und Neue Species von Thecaten aus Japan. December 2, 1913, p. 139.

This handsome species was originally described by Stechow, who found it in a collection from Japan. His specimens did not show the gonosome and it is fortunate that the *Albatross* material contains specimens which show this feature in a very satisfactory manner. The Philippine specimen is described as follows:

Trophosome.—Colony flabellate in form, 3½ cm. in height, and with a spread of 2 cm. Stem fascicled, branches simple and subalternate. Branches are almost at right angles to the stem and not divided into internodes. Hydrothecae, one on the main stem just above the branch origins and another almost midway between adjacent branches, sessile. Those on the branches are strictly alternate, almost sessile, with basal chambers blending insensibly into the very short pedicel, if such it may be called. Hydrothecae tubular, the distal portions being bent toward the front of the stem and branches resembling the figure given by Allman for his *Lafoëa convallaria* from the Gulf Stream,¹⁴ except that Allman's species had distinct pedicels more than half the length of the hydrothecae. The hydrothecal margins are often delicately rimmed. There is usually a nematophore near the base of each hydrotheca and others scattered along the branches and tubes of the fascicled stem. These are minute and tubular in form on the stem, but on the branches with enlarged distal ends, much like those in the Plumularidae. Many of the nematophores are broken off and those on the stem are shorter and less numerous than reported by Stechow.

Gonosome.—Gonangia aggregated into a coppinia mass, as conjectured by Stechow, on the proximal part of the main stem. They

¹³ Hydroids of the Hawaiian Islands, 1905, pl. 10, fig. 8.

¹⁴ Memoirs of the Museum of Comparative Zoölogy, vol. 5, No. 2, 1877, pl. 9.

are shaped something like an anchor with a very strong, stubby shank and the two flukes ending in apertures which open in opposite directions; that is, if a gonangium is lying on one of its broad sides, one opening is directed upward and the other downward. Interspersed between the gonangia of the coppinia mass are normal hydrothecae and a few straggly, irregular, branchlike structures with neither hydrothecae nor nematophores.

Locality.—Dredging station 5664, Macassar Strait near Kapoposang, lat. $4^{\circ} 43' 22''$ S., long. $118^{\circ} 53' 18''$ E.; depth, 400 fathoms.

Distribution.—Sagami Bay, Japan, 600 meters (Stechow).

This species is very close to one described by me under the name *Lictorella cervicornis* from Hawaii,¹⁵ which differs from it in having more nearly sessile hydrothecae and in having branches or phylactogonia resembling deer horns, arching above the gonangia and suggesting the name "*cervicornis*."

Family SERTULARIDAE

SERTULARIA DIVERGENS (Lamouroux) according to Bale¹⁶

Dynamena divergens LAMOUROUX, Histoire des Polypiers Coralligènes flexibles, 1816, p. 180.

(?) *Sertularia dubia* HARGITT, Hydroids of the Philippine Islands, 1924, p. 494.

The species dredged by the *Albatross* agrees quite closely with the description by Bale of *Sertularia divergens* (Lamouroux), but neither agrees with the figures given by Lamouroux, which are very inaccurate, but our specimen as well as Hargitt's description agrees very closely with Bale's description and it is probably the same species that the latter author regards as *S. divergens*.

In this connection it seems desirable to point out the fact that Hargitt's name for another new species *Sertularia minuta* can not hold, as that name is preoccupied by Bale in his work "On the Hydroids of Southeastern Australia, etc." (1881, p. 90), in which he gives the name *Sertularia minuta* to an extremely different species, which name must have the priority.

I do not propose a new name for this form *S. minuta* of Hargitt, because it is extremely likely that it is the same species that was described by Bale under the name *Sertularia tenuis*.¹⁷

Locality.—Dredging station 5413, between Cebu and Bohol, Luis Point, $10^{\circ} 10' 35''$ N., $124^{\circ} 3' 15''$ E.; depth, 42 fathoms.

Distribution.—Australia (Bale), several localities cited; (?) Philippine Islands (Hargitt).

¹⁵ Hydroids of the Hawaiian Islands, U. S. Fish Commission Bulletin, 1903, pt. 3, 1905, p. 946, pl. 10, figs. 5-9.

¹⁶ Australian Hydroid Zoophytes, 1884, p. 81, pl. 5, fig. 3; pl. 19, fig. 16.

¹⁷ Catalogue of the Australian Hydroid Zoophytes, 1884.

THUIARIA QUADRIDENS Bale

Thuiaria quadridens BALE, Australian Hydroid Zoophytes, 1884, p. 119, pl. 7, figs. 5, 6.

Thuiaria quadrilateralis HARGITT, Hydroids of the Philippine Islands, 1924, p. 493, pl. 5, fig. 17.

The specimens secured by the *Albatross* are very much like those described by Bale in detail, although their manner of growth is parasitic, being found on a plumularian hydroid and growing from a creeping root stalk from which erect and undivided branches arise. The details of the hydrothecae, however, appear to correspond quite exactly with *T. quadridens*, and I therefore feel it best to refer it to that species.

The figures given by Bale and Hargitt are so nearly identical that I have little hesitation in relegating *T. quadrilateralis* to synonymy.

Gonosome.—This was found by Hargitt on his specimens and described as follows: "Gonangia large, several times the size of the hydrothecae, and a four-sided shape, borne on short pedicels of pinnae, none on stems of my specimens."

Locality.—Dredging station 5251, Gulf of Davao, Linao Point, 7° 5' 12'' N., 125° 39' 35'' E.; depth, 28 fathoms.

Distribution.—Australia, Port Curtis (Bale); Philippine Islands (Hargitt).

DICTYOCLADIUM ABERRANS, new species

Plate 41, figs. 4, 5

Trophosome.—Colony 8 cm. in height and with a spread of 3½ cm., flabellate in form. Main stem fascicled proximally, but simple for the greater part of its length, without nodes; branches alternate.

Hydrothecae in pairs, the pairs being separated by more than their height and the bases of the individual hydrothecae are nearly contingent proximally but divaricate distally. On the main stem the hydrothecae are arranged so that there is one above and one below each branch origin and one opposite each branch origin. Occasionally there are three hydrothecae in a whorl and on one branch there are uniformly four of them in a whorl. The individual hydrothecae are flask-shaped with the distal ends curving gracefully outward, the margin square and with four low teeth as in many species of *Sertularella*, and there are also annular marks ("Ringfalte" of Stechow) around the margin. Operculum of four equal triangular flaps.

Gonosome.—On another specimen a single gonangium was found. It is extremely elongated, almost cylindrical in shape, about four times as long as wide, with walls distinctly but not deeply annulated, distal part narrowing insensibly into a broad marginal collar. The margin is impaired and seems to have four teeth.

Localities.—The holotype, Cat. No. 42177, U. S. N. M., was secured at dredging station 5593, Sibuko Bay, Borneo and vicinity, Mount Putri, 4° 2' 40'' N., 118° 11' 20'' E.; depth, 38 fathoms. The specimen upon which the gonangium was found was from dredging station 5428, Eastern Palawan and vicinity, 30th of June Island, 9° 13' N., 118° 51' 15'' E.; depth, 1,105 fathoms. This is one of the greatest depths at which specimens were secured on that cruise. Other stations were 5641, Buton Strait, 4° 29' 24'' S., 122° 52' 30'' E.; depth, 39 fathoms; and 5255, Gulf of Davao, Dumalag Island, 7° 3' N., 125° 39' E.; depth, 100 fathoms.

This species goes most reasonably into the genus *Dictyocladium*, agreeing with it in having a four-flapped operculum in the absence of an abcauline blind sack and in having the hydrothecae in more than two rows.

The appearance of three or four hydrothecae in a whorl is rare and may perhaps be regarded as an abnormality, but it appears the normal arrangement. The specimen from Davao Bay found growing on pearl oysters agrees with the form described above in the characters of the stem, branches, and form of hydrothecae. It differs in having the hydrothecae regularly in whorls of four, a character found in some of the branches of the specimen already described. At first when examining the specimen from Davao Bay I was inclined to consider it the representative of a new genus, but when the other specimens disclosed hydrothecae disposed in pairs, in threes, and in fours, sometimes all on the same branch, the idea of a generic distinction was abandoned, and it seemed best to place it in the genus *Dictyocladium*.

SERTULARELLA CORNUTA Stechow

Plate 42, figs. 1, 2

Sertularella cornuta STECHOW, Neue Hydroiden der Deutschen Tiefsee-Expedition, nebst Bemerkungen über einige andere Formen, 1923, p. 12.
Sertularella polyzonias, var. *cornuta* RITCHIE, The Hydroids of the Indian Museum, No. 1, 1910, p. 10.

Trophosome.—Colony 5½ cm. in height, pinnate in form, 4 cm. spread from tip to tip. Main stem simple, slightly sinuous, divided into regular internodes, each giving off a branch from near its proximal end and three hydrothecae, one opposite, one above, and one below each branch. Branches alternate and projecting from the stem at almost a right angle. They are quite straight, divided into irregular internodes, particularly near their distal ends, each internode bearing from two to four hydrothecae. Hydrothecae rather closely approximate, the top of one being opposite the base of the one next above it. They are in the shape of a bent flask swollen proximally, the distal one-third being free and bending outward from the branch.

The aperture is square, often several times reduplicated as in Ritchie's figure. Margin with four rather prominent teeth and operculum with four flaps.

Gonosome.—Gonangia fusiform, regularly and deeply annulated with a quadrate collar from the corners of which four conspicuous horns project horizontally as is well represented by Ritchie's figure.

Localities.—Dredging station 5428, Eastern Palawan and vicinity, 30th of June Island, 9° 13' N., 118° 51' 15" E.; depth, 1,105 fathoms. Station 5642, Buton Strait, Tikola Peninsula, 4° 31' 40" S., 122° 49' 42" E.; depth, 37 fathoms.

A comparison of this species with typical *S. polyzonias* from Cape Cod shows very material differences in the trophosome. The hydrothecae of *polyzonias* are fully twice as long as in *cornuta* and are much more distant from each other. The colony of *S. polyzonias* is branched in a very straggling and irregular manner instead of being irregularly pinnate as in *S. cornuta*. The differences between the gonangia have been noted by Ritchie.

SERTULARELLA MIRABILIS Jäderholm

Plate 42, figs. 3, 4

Sertularella mirabilis JÄDERHOLM, Ueber Aussereuropäische Hydroiden des Zoologischen Museums der Universität Upsala, 1896, p. 9, pl. 2, fig. 1.

I have been unable to find any account of this truly remarkable sertularian subsequent to the original description by Jäderholm and feel that a description including that of the gonosome, which I believe to be hitherto unknown, will be well worth while.

Trophosome.—The colony is cylindrical in form, resembling a sponge, 10 cm. high and 1½ cm. in diameter. The main stem is distinctly fascicled proximally for about 8 mm. It then breaks up abruptly into a perfect maze of short slender profusely anastomosing branches and branchlets which are indistinguishable from each other and form a close network or web, a cylindrical mass of intricately interwoven branches. The whole thing resembles in miniature what is known as the "vegetable sponge" in tropical America. The branching is so irregular as to defy description, there being apparently no internodes and the branches often changing direction at abrupt angles at which single hydrothecae often are found. Hydrothecae alternate as a usual thing and quite distant, although the anastomoses are so frequent that there are seldom more than three hydrothecae between forkings. Often the meshes inclose fairly regular hexagons. Hydrothecae rather small, those in the forkings having the form of truncated cones. The branchlets often terminate in a hydrotheca which is hardly greater in diameter than the branch that bears it as if on a pedicel. Lateral hydrothecae are almost barrel-shaped, but larger below and plainly annulated

throughout. The margin is square with four low teeth and a four-flapped operculum.

Gonosome.—The gonangia are small, about one and one-half times the length of the hydrothecae. They grow in clusters on the branches, are ovate in form with four or five very irregular annular corrugations, margin round and borne on a shallow hardly evident collar. These gonangia are not so regular and symmetrical as is usual in this genus, perhaps on account of crowding in the mesh-work of the branches.

Localities.—Dredging station 5310, China Sea, vicinity of Hong-kong, $21^{\circ} 33' N.$, $116^{\circ} 13' E.$; depth, 100 fathoms. Station 5311, same locality, $21^{\circ} 33' N.$, $116^{\circ} 15' E.$; depth, 88 fathoms. Station 5312, same locality, $21^{\circ} 30' N.$, $116^{\circ} 32' E.$; depth, 140 fathoms.

Distribution.—The type locality is Hirudostrasse, Japan, $33^{\circ} 30' N.$, $129^{\circ} 18' E.$; depth, 45 fathoms. The writer has not seen any further report of distribution of this remarkable species.

SERTULARELLA PHILIPPINENSIS Hargitt

Sertularella philippinensis HARGITT, Hydroids of the Philippine Islands, 1924, p. 496, pl. 6, fig. 22.

The specimens described by Hargitt agree very well with those collected by the *Albatross*. The following points not mentioned by Hargitt may be noted:

The main stem is unbranched for about half its length and is very clearly annulated or corrugated proximally, the corrugations becoming less numerous distally until they appear in distant pairs. In the branched portion of the stem there are distant irregularly spaced corrugations which tend to appear just above each branch. The margin of the hydrothecae often bears a thickened rim, but is without reduplication. The gonangia are much as described by Hargitt, but the teeth are often not nearly so prominent as figured by him, although there is an occasional one that would be represented very well by his drawing.

Localities.—Dredging station 5310, China Sea, vicinity of Hong-kong, $21^{\circ} 33' N.$, $116^{\circ} 13' E.$; depth, 100 fathoms. Station 5311, same general locality, $21^{\circ} 33' N.$, $116^{\circ} 15' E.$; depth, 88–100 fathoms.

Hargitt's localities are not designated except by station numbers, neither is there any indication of the depth from which specimens were taken.

IDIA PRISTIS Lamouroux

Idia pristis LAMOUROUX, Histoire des Polypiers coralligènes Flexibles, 1816, p. 199.

This well-known species is abundantly represented in the collection under discussion and has been described by many authors since

the original discovery in 1816. It, therefore, needs no further description here.

Localities.—Dredging station 5097, China Sea, 14° 15' 15'' N., 120° 33' 52'' E.; depth, 30 fathoms. Station 5100, China Sea off Southern Luzon, Corregidor Light, 14° 17' 15'' N., 120° 32' 40'' E.; depth, 35 fathoms. Station 5134, Sulu Archipelago, 6° 44' 45'' N., 121° 48' E.; depth, 25 fathoms. Station 5146, Sulu Archipelago near Siasi, Sulade Island, 5° 46' 40'' N., 120° 48' 50'' E.; depth, 24 fathoms. Station 5221, between Marinduque and Luzon, 13° 38' 15'' N., 121° 48' 15'' E.; depth, 193 fathoms. Station 5248, Gulf of Davao, Lanang Point, 7° 7' 25'' N., 125° 40' 24'' E.; depth, 18 fathoms. Station 5400, North of Cebu, 11° 24' 24'' N., 124° 5' 30'' E.; depth, 25 fathoms. Station 5413, between Cebu and Bohol, 10° 10' 35'' N., 124° 3' 15'' E.; depth, 42 fathoms. Station 5479, between Samar and Leyte, 10° 47' 15'' N., 125° 17' 50'' E.; depth, 62 fathoms. Station 5481, same locality, 10° 27' 30'' N., 125° 17' 10'' E.; depth, 61 fathoms.

General distribution.—Almost world wide in tropical and temperate oceans, especially in the eastern part of the Pacific, where it has been reported as far south as New Zealand. It has also been reported by Allman from Bahia, Brazil, and the South Atlantic Ocean.

DIPHASIA DIGITALIS (Busk)

Sertularia digitalis BUSK, Voyage of the *Rattlesnake*, vol. 1, 1852, p. 387.

Desmoseyphus longithecus ALLMAN, Mem. Mus. Comp. Zool., vol. 5, no. 2, 1877, p. 26.

Diphasia digitalis BALE, Australian Hydroid Zoophytes, 1884, p. 101.

This well marked species was first described more than 70 years ago and has since been reported from various localities in both the Atlantic and Pacific Oceans. The specimens secured during the Philippine cruise of the *Albatross* are quite characteristic, although the gonosome is absent.

Locality.—Dredging station 5163, Sulu Archipelago, Tawi Tawi group, Observation Island, 4° 59' 10'' N., 119° 51' E.; depth, 28 fathoms.

Distribution.—Prince of Wales Channel, Torres Strait, 9 fathoms, West Indies (Allman, Nutting); off Bahia, Brazil (Allman), 10 to 20 fathoms; several *Albatross* stations in the North Atlantic, including West Indies down to 213 fathoms; Philippine Islands (Hargitt); Australia (Stechow).

DIPHASIA HEURTELI Billard

Plate 42, figs. 5, 6, 7

Diphasia heurteli BILLARD, Note critique sur divers genres et espèces d'Hydroïdes, 1924, p. 67.

As the gonosome was not present on the type specimen described by Billard and as we have abundant material both of the trophosome

and gonosome, it seems best to give a detailed description of the species here in spite of some repetition so far as the trophosome is concerned.

Trophosome.—Colony growing as a parasite on a plumularian hydroid, *Aglaophenia triramosa* Nutting, over which it has ramified extensively. Hydrocaulus in the form of a creeping root stalk from which straight branches or hydrocladia arise at irregular intervals and attain a height of about 3 cm. There is a slight constriction below each pair of hydrothecae. Hydrothecae in pairs, tubular, gracefully bent outward to their distal ends, about two-thirds of their length being adnate to the branch. The bend is not angular but forms an even graceful curve. Aperture almost horizontal, and, therefore, opening upward, with a distinct operculum composed of a single adcauline flap which fits down below the hydrothecal margin on the abcauline side. The hydranths are not sufficiently well preserved for description.

Gonosome.—Gonangia arranged in a single row along one side of the branches. They are quite ornate in appearance and very unsymmetrical and their extreme transparency renders description extraordinarily difficult. Those on our specimen contain ova in what appears to be an internal marsupium. A front view shows a long central hornlike leaf about three-fourths the length of the entire gonangium, and two very broad flattened leaves, with upper edges with five or six irregular and somewhat jagged projections or teeth to each leaf. Focusing lower, one can see on the opposite side a thick hornlike process which probably represents a leaf, and another similar one curving in the opposite direction, the two seeming to embrace the marsupium. In a side view the gonangia appear much more slender showing an anterior long slender horn, a posterior short stouter and more curved one, and lateral leaves, one on each side with their jagged edges. These are much narrower in this point of view.

Localities.—Dredging station 5310, China Sea, vicinity of Hongkong, 21° 33' N., 116° 13' E. Station 5311, China Sea, vicinity of Hongkong, 21° 33' N., 116° 15' E.; depth, 88 fathoms.

Distribution.—The type was presumably from the eastern coast of South Africa.

DIPHASIA INORNATA, new species

Plate 43, fig. 1

Trophosome.—Colony pinnate, stem simple, total height 7½ cm., spread 3½ cm. Stem divided into irregular internodes, almost straight, although very slightly flexuose with a tendency to bearing two branches to each internode. Proximal 1 cm. without hydrothecae. The branched portion bears one hydrotheca above, one below and one opposite each branch. Branches alternate, constricted at

their origins, each borne on a distinct shoulderlike process of the stem and separated from it by a deeply incised node. Hydrothecae strictly alternate, usually about six to each internode, immersed for about three-fourths their entire length. Distal portion abruptly constricted and bending outward from the flask-shaped body. Margin pitcher shaped and bearing a single adcauline operculum, as is characteristic of the genus. The hydranths are not sufficiently well preserved for description.

Gonosome.—Gonangia borne on upper side of branches, small for this genus, oblong-ovate in shape and without the spines characteristic of *Diphasia*. There are indications of an internal marsupium which in some instances seems to have broken out of the aperture and formed a sort of an acrocyst. The indications are that these gonangia bear male reproductive elements.

Locality.—Dredging station 5325, off northern Luzon, Hermanos Island, 18° 34' 15" N., 121° 51' 15" E.; depth, 224 fathoms.

Holotype.—Cat. No. 42178, U.S.N.M.

This species comes nearest to *Diphasia kincaidi* (Nutting),¹⁸ from which it differs in having strictly alternate instead of subopposite hydrothecae, which are less robust than in the former species. The gonangia are a good deal the same in the two, except that those of *D. kincaidi* have no internal marsupium.

The present writer has always stood for a statute of limitations for zoological names, and therefore does not follow Stechow,¹⁹ who regards *Diphasia* of Agassiz as a synonym of *Nigellastrum* of Oken, 1815.

PASYTHEA QUADRIDENTATA (Ellis and Solander)

Sertularia quadridentata ELLIS and SOLANDER, Nat. H. Zooph., 1786, p. 57.

Pasythea quadridentata ESPER, Die Pflanzenthiere in Abbildungen. vol. 3, 1788, p. 237.

Pasythea, species, INABA, Hydroida of the West Coast, Kishu, 1892, figs. 11-14.

Pasythea nodosa HARGITT, Notes on a few Coelenterates of Wood's Hole (Contr. Zool. Lab. Syracuse Univ.) 1908, pp. 114-117.

Pasythea quadridentata FRASER, Some Hydroids of Beaufort, N. C., 1912, p. 372.

I have no doubt that Fraser was right in his decision that Hargitt's *P. nodosa* is the same as the original *Pasythea quadridentata*, as proved by the finding of the gonangia.

In the specimen secured by the *Albatross* in 1907 the gonangia are also present and exactly like those figured by me in American Hydroids (pt. 2, pl. 13, fig. 5).

¹⁸ *Thuiaria elegans* Nutting, Hydroids of the Harriman Alaska Expedition, 1901, p. 187.

Diphasia kincaidi Nutting, Hydroids from Alaska and Puget Sound, 1899, p. 743.

¹⁹ Hydroidenfauna des Mittelmeeres, Amerikas u. s. w., 1923, p. 160.

Locality.—Dredging station 5559, Jolo Island and vicinity, Cabalian Point, 5° 51' 36" N., 121° 0' 45" E. Surface, on floating *Sargassum*.

Distribution.—Almost world-wide except in the polar regions, in tropical, subtropical, and temperate zones.

This interesting species on account of its habitat on floating seaweed has been very widely distributed and thus has come to vary greatly. I strongly suspect that there is only one species of the genus and that the forms such as *P. philippina* of Marktanner-Turneretscher and *P. griffini* of Hargitt will eventually be relegated to the list of synonyms.

Family SYNTHECIDAE

SYNTHECIUM TUBITHECUM (Allman)

Sertularia tubithecica ALLMAN, Memoirs Museum Comparative Zoölogy, vol. 5, No. 2, 1877, p. 24.

Synthecium tubithecum NUTTING, American Hydroids, pt. 2, 1904, p. 134.

This well-known and graceful species was dredged by the *Albatross* at station 5311, China Sea, vicinity of Hongkong, 21° 33' N., 116° 15' E.; depth, 88 fathoms.

The gonosome is present and is very much like that of the type examined by me in the Museum of Comparative Zoology at Cambridge,²⁰ being very closely and deeply annulated throughout and with a narrow neck and everted margin much like many gonangia found in the Sertularidae, especially in the genus *Sertularella*.

Distribution.—West Indies (Allman), Amboina and Ternate Molucca (Pictet and Campenhausen), Hawaii (Nutting), Japan (Stechow).

This appears to be the first report of its occurrence in the Philippines, unless, as I suspect, Hargitt's *Synthecium flabellum*²¹ is a synonym for *S. tubithecum*. It agrees quite closely, so far as the trophosome is concerned, and his drawings of the gonangia show no details by which his species can be differentiated from *S. tubithecum*.

Family PLUMULARIDAE

PLUMULARIA BUSKII Bale

Plumularia buskii BALE, Australian Hydroid Zoophytes, 1884, p. 125, pl. 10, fig. 3; pl. 19, figs. 34-35.

Trophosome.—Colony pinnate, 3 cm. high and with a spread of 1 cm. Stem not fascicled, with some irregular annulations at the basal end, no evident nodes except at the extreme distal end where there are a few oblique nodes resembling those on the hydrocladia.

²⁰ American Hydroids, pt. 2, The Sertularidae, 1904, p. 134.

²¹ Hydroids of the Philippine Islands, 1924, p. 497.

The stem bears a hydrotheca on its front near the base of each hydrocladium. Hydrocladia alternate, borne on the front of the stem rather than on its sides, each with a strongly marked node a short distance from the stem; but there are no evident internodes except near the ends of the hydrocladia borne on the distal part of the stem. Here they are oblique and there is a tendency toward a hydrotheca to each internode. In one or two places intermediate internodes are seen, but this is quite exceptional. Hydrothecae short cylinders in shape, resembling drums, the distal half of the adcauline side being free, slightly expanded near the margin which is even and round. Nematophores—below the base of each hydrotheca is a nematophore that greatly resembles those of the statoplean plumularians, being sessile and apparently adherent to the lower part of the hydrotheca. There are usually two other mesial nematophores between successive hydrothecae which are on short pedicels and movable. A pair of supracalyceine nematophores arise from the point where the distal part of the hydrotheca becomes free, but do not rise to the level of its margin. Their distal part is bell-shaped and the margin somewhat flaring. There are also irregularly placed nematophores on the stem.

Gonosome.—Gonangium oblong ovate, round in section, aperture oblique, borne on a short pedicel growing from a hydrocladium at the base of a hydrotheca. There is a single large nematophore on the proximal part of the gonangium near the pedicel. The gonangia have a slightly thickened rim around the aperture and the contents indicate that the colony is male.

Locality.—Davao Bay, from pearl oyster, several specimens secured.

Distribution.—Griffiths Point, Australia (Bale).

PLUMULARIA AGLAOPHENOIDES Bale

Plate 43, figs. 2, 3

Plumularia aglaophenoides BALE, Australian Hydroid Zoophytes, 1884, p. 126, pl. 10, fig. 6.

The specimens secured by the *Albatross* agree quite closely with the description and figures by Bale, which are so satisfactory that nothing need be added so far as the trophosome is concerned.

The fragments before me do not show the fascicled stem as described by Bale, but they may be branches rather than parts of the main stem.

Gonosome.—Heretofore unknown. Gonangia borne on the hydrocladia, in the shape of heavy curved clubs. Smaller than in the last species and about twice the height of the hydrothecae. No nematophores are seen at the bases of the gonangia.

Locality.—Dredging station 5151, Sulu Archipelago, Tawi Tawi group, Sirun Island, 5° 24' 40'' N., 120° 27' 15'' E.; depth, 24 fathoms.

Distribution.—Broughton Island, Australia, 25 fathoms. This seems to be the first report of the occurrence of this species in the Philippine region.

PLUMULARIA FLABELLATA, new species

Plate 43, figs. 4, 5

Trophosome.—Colony strictly flabellate in form, 8.7 cm. high and with a spread of 9.5 cm. Color dark brown after long immersion in alcohol. Stem, primary branches and secondary branches fascicled. The branches and branchlets subopposite. Hydrocladia borne on main stem, primary and secondary branches, opposite and springing from the sides rather than the front of the stem or branch and more closely approximated than is usual in this genus. Indeed, the general facies of the colony would lead one to regard it as belonging to the Statoplea rather than to the Eleutheroplea were the nematophores not free or movable. Hydrocladia divided by oblique nodes into regular internodes, each of which bears a hydrotheca. Hydrothecae quite small, rather closely approximated, deep, pitcher-shaped with a margin devoid of teeth, everted in front and with the sides beveled off behind where they join the hydrocladium. The internode behind the hydrotheca is dense and shows internal thickenings of chitin opposite the mesial nematophore and below the process bearing the supracalcine nematophore just below the node between the adjacent hydrothecae. Nematophores very minute, movable, fragile, often lacking. The supracalcine pair are borne on slight processes below the top of the hydrotheca and often hang down into the hydrothecal cavity, this being rendered possible by the beveling of the hydrothecal margin behind. The mesial nematophore is borne on a relatively short process below the hydrotheca. There are often two cauline nematophores below the proximal hydrotheca on each hydrocladium.

Gonosome.—Not present.

Locality.—The holotype, Cat. No. 42179, U.S.N.M., is from Davao Bay, growing on a pearl oyster. Station 5254, Gulf of Davao, Linao Point, 7° 5' 42'' N., 125° 39' 42'' E.; depth, 21 fathoms. The hydrothecae of this fine species very closely resemble those of *P. dendritica* Nutting,²² but it differs widely from that species in the form of colony, manner of branching, color, and character of the hydrocladial internodes.

²²American Hydroids, pt. 1, the Plumularidae, 1900, p. 67, pl. 8, figs. 4-6.

PLUMULARIA HARGITTI, new species

Plate 44, figs. 1, 2

Trophosome.—Colony $4\frac{1}{2}$ cm. high and with a spread of 1 cm., main stem not fascicled, straight with irregularly disposed straight nodes and bearing neither hydrothecae nor nematophores. Hydrocladia alternate and closely approximated, borne on distinct shoulders of the stem and projecting from the stem at an angle of about 45° , divided into alternating hydrothecate and intermediate internodes which are divided by alternating straight and oblique nodes, the latter being just below the hydrothecae and the former just opposite the tops of the hydrothecae. Hydrothecae large for this group, rather deep, cup-shaped, with slightly everted margins, one and one-half times as deep as wide, and separated by a distance of about one and one-half times their height. Nematophores small, the supracalycine pair being inserted on the hydrocladium some distance below the free distal part of the hydrotheca and not attaining to the level of the point where the latter separates from the branch. There are usually two, rarely three, mesial nematophores between the adjacent hydrothecae. The one immediately below each hydrotheca is somewhat stouter than the others.

Gonosome.—Gonangia large, elongated saclike structures with rounded distal ends, about six times the height of the hydrothecae and with a short pedicel. There are two to four nematophores borne on the gonangium just above the pedicel.

Locality.—Dredging station 5174, vicinity of Jolo, Jolo Light, $6^\circ 3' 45''$ N., $120^\circ 57'$ E.; depth, 20 fathoms.

Holotype.—Cat. No. 42180, U.S.N.M.

This species is named in honor of my friend, Dr. Charles W. Hargitt, of Syracuse University, who has done much valuable morphological and experimental work on the hydroids. It evidently belongs to the *catharina* group but differs from that species in having alternate and more nearly approximated hydrocladia and hydrothecae and in shape and size of gonangia. It differs from *P. aglaophenoides* Bale in having a fascicled stem and in several other details.

PLUMULARIA DENDRITICA Nutting

Plumularia dendritica, NUTTING, American Hydroids, pt. 1, p. 67, pl. 8, figs. 4-6.

The specimens dredged by the *Albatross* during her Philippine cruise agree very exactly with the original descriptions and figures, and a comparison with the type specimen in the museum of the State University of Iowa confirms this view.

Localities.—Dredging station 5163, Sulu Archipelago, Tawi Tawi group, Observation Island, $4^\circ 59' 10''$ N., $119^\circ 51'$ E.; depth, 28

fathoms. China Sea, vicinity of Formosa, Ibugos Island, 20° 19' 30'' N., 121° 51' 15'' E.; depth, 26 fathoms.

Distribution.—The type and until now the only known specimen was from near Little Cat Island, Bahamas, from shallow water.

The specimens secured of this species were rather fragmentary, and, of course, much smaller than the type which was one of the largest plumularian hydroids that the writer has ever seen.

PLUMULARIA CAMARATA, new species

Plate 44, figs. 3, 4

Trophosome.—Colony flabellate in form, 12 cm. high, and with a spread of 4 cm. Stem, branches, and branchlets fasciated, very dark in color, the branches springing irregularly from the opposite sides of the stem and the branchlets similarly related to the branches. Hydrocladia borne on the stem, branches, and branchlets alternate on opposite sides of the branches from which they spring; not regularly divided into internodes, the nodes being far apart, oblique, and most apparent near the proximal end of the hydrocladia. These latter have their interior divided by very strongly marked internal ridges, there being usually four behind each hydrotheca suggesting a division of the hydrocladia into a number of chambers; hence the name "*camarata*." These ridges are strongest on the proximal and weakest on the distal parts of the hydrocladia.

Hydrothecae very deep, tubular, three times as high as wide, and of approximately equal diameter throughout most of their length. Margin without teeth of any kind but sharply beveled on its adcauline side where it joins the hydrocladium at a very acute angle. The hydrothecae are very closely approximated so that the top of one reaches almost to the base of the one next above it. Nematophores, supracalycline pair small, with hardly any evident supporting brackets, arising from the hydrocladium at the point where it is joined by the greatly beveled hydrothecal margin, their distal ends slightly if at all, overtopping the highest (abcauline) part of the hydrothecal margin. Often these nematophores appear to topple over into the hydrothecal cavity. Mesial nematophores rarely present in the specimen described, but they are occasionally seen on the proximal part of the hydrocladia where they are borne on short, rounded prominences just below the hydrothecal bases. Cauline nematophores are found, often in pairs, on the stem and branches near the axils of the hydrocladia. All nematophores are bithalamic and free.

Gonosome.—Not present.

Locality.—Dredging station 5165, Sulu Archipelago, Tawi Tawi group, Observation Island, 4° 58' 20" N., 119° 50' 30" E.; depth, 9 fathoms.

Holotype.—Cat. No. 42181, U.S.N.M.

This species is evidently nearest *P. dendritica* Nutting,²³ which it resembles greatly in the form of the hydrothecae and in general appearance. It differs, however, in having much more distant hydrothecae, in the absence of regular hydrocladial internodes and in the very strong internal ridges in the hydrocladia. Although the two species are found in the same general region, the specimens differ constantly in the points just mentioned and the writer feels that they should be regarded as distinct species. Indeed, they are fully as distinct as many other species of *Plumularia* and *Aglaophenia* which have been recognized. This species also resembles *Plumularia asymmetrica* Bale²⁴ particularly in the general shape of hydrothecae, the internal hydrocladial ridges and the nematophores. It differs materially in not having the anterior intrathecal ridge and in not having the two sides of the hydrothecae unsymmetrical as described by Bale.

ANTENNELLA BIARMATA, new species

Plate 44, fig. 5

Trophosome.—Colony consisting of a number of upright hydrocladia springing directly from a creeping root-stalk and attaining a height of about 3 cm. Proximal part of hydrocladia devoid of hydrothecae but often bearing a double row of nematophores on one side, there being sometimes as many as 16 pairs of nematophores below the first hydrotheca. Nodes oblique, not regularly disposed, but with a tendency to showing two hydrothecae to each internode. Often there is a very pronounced oblique node about the middle of the hydrocladium. Hydrothecae stiffer and more dense than in other species of this genus that I have seen, closely approximated, being separated by less than their own height, cylindrical, deeper than most of the genus, one and one-half times as deep as wide; margin even, distinctly everted so that the actual aperture is much greater than a section below the margin. About one-fifth of the distal part of the hydrotheca is free from the hydrocladium which bears it. Nematophores—there are two pairs of supracalcine nematophores, one borne on a long rodlike support springing from the hydrocladium almost opposite the middle of the hydrotheca and extending outward and a little upward nearer to the hydrothecal margin, so that the nematophore itself projects beyond the front of the hydrotheca but considerably below the aperture. Immediately

²³ American Hydroids, pt. 1, 1900, p. 67, pl. 8, figs. 4-6.

²⁴ Report on the Hydroids collected in the Great Australian Bight, etc., 1914, p. 29, pl. 4, figs. 2 and 3.

above the bases of these supports is another pair of nematophores which are practically sessile on the hydrocladium. Between these and the bottom of the next hydrotheca above are usually two and occasionally three pairs of cauline nematophores, thus making four or five pairs of nematophores to each hydrotheca. The nematophores are all two-chambered after the usual eleutheroplean type.

Gonosome.—Not present.

Locality.—Davao Bay, borne on pearl-oyster shells, depth not given.

Holotype.—Cat. No. 42182, U.S.N.M.

This very remarkable species may eventually require a new genus for its reception, but the writer desires to avoid the establishing of new genera whenever practicable, especially where the gonosome is not known.

ANTENNELLA RECTA, new species

Plate 44, figs. 6, 7

Trophosome.—Colony consisting of hydrocladia springing directly from a creeping root-stalk, 16 mm. in height. Hydrocladia divided very obscurely into internodes, each of which bears a hydrotheca. Nodes not oblique but at right angles to the axis of the hydrocladium. Occasionally there is an oblique node just below the proximal hydrotheca. Hydrothecae separated by twice their height, bell-shaped with margins slightly flaring, height equal to the diameter of the aperture. Nematophores—supracalycine pair borne on processes from the hydrocladium nearly opposite the aperture of the hydrothecae and considerably overtopping the latter. There is a mesial nematophore just at the base of the hydrotheca and one or two others between this and the next hydrotheca below.

Gonosome.—Not known.

Locality.—Dredging station 5310, China Sea, vicinity of Hongkong, 21° 33' N., 116° 13' E.; depth, 100 fathoms.

Holotype.—Cat. No. 42188, U.S.N.M.

This species differs from all others of the genus except *P. microscopica* (Mulder and Trebilcock)²⁵ in having no intermediate internodes and nodes straight and not oblique.

According to the figure given by the authors the hydrotheca of *P. microscopica* is tubular and more than twice as deep as broad.

NEMERTESIA CYLINDRICA (Bale)

Antennularia cylindrica BALE, Australian Hydroid Zoophytes, 1884, p. 146, pl. 10, fig. 7.

The specimens collected by the *Albatross* agree very well with the description and figures given by Bale. In the former, however, the

²⁵ Geelong Naturalist, vol. 4, ser. 2, 1909 (pages not numbered in reprint), pl. 1, fig. 4.

mesial nematophores are absent except those immediately below each proximal hydrotheca on the hydrocladium. The gonosome is unknown.

Locality.—Dredging station 5596, off Zamboanga, Mindanao, 6° 54' N., 122° 4' 30'' E.; depth, 9 fathoms.

Distribution.—Port Curtis, Australia (Bale).

As Bale says, this species resembles *Plumularia cylindrica* Kirchenpauer. It differs greatly, however, in the character of the supracalycine nematophores, a character not well brought out by Bale. Those in *Nemertesia cylindrica* are very broad and stout, almost sessile with a very conspicuous bay or sinus in the margin.

ANTENNOPSIS PACIFICA, new species

Plate 45, figs. 3, 4

Trophosome.—Colony 10 cm. long and with a spread of 2 cm. Main stem not canaliculated nor fascicled, flexuose, dark brown in color; nodes almost all oblique, deeply incised, irregular in distribution. Branches much like the stem, scattered, occasionally bifurcating, divided irregularly into internodes by oblique nodes, but tending to bear two hydrocladia on each internode. Hydrocladia all springing from the upper side of the branch, but inclined alternately to the right and left, divided into regular internodes, each of which bears a hydrotheca on its proximal part. No intermediate internodes. Hydrothecae small, conical in shape, margins smooth everted, borne on thick shoulders of the hydrocladia, rather closely approximated, being separated by about twice their height, although sometimes considerably more distant. All, however, are more closely approximated than other species of this genus that I have known. Nematophores relatively very large, often about as high as the hydrothecae, bithalamic, with the distal chamber flaring, conical in outline. Supracalycine pair inserted almost on a level with the top of the hydrotheca and rising above it a distance almost equal to that of the height of the latter. A mesial nematophore is inserted on the shoulder immediately below each hydrotheca, and these are the largest of the nematophores. Two others are usually placed between the mesial one and the next hydrotheca below, while there are few nematophores on the stem or branches.

Gonosome.—Not present.

Locality.—Dredging station 5148, Sulu Archipelago, vicinity of Sirun Island, 5° 35' 40'' N., 120° 47' 30'' E.; depth, 17 fathoms.

Holotype.—Cat. No. 42183, U.S.N.M.

So far as the writer knows, this very distinct species is the first of the genus *Antennopsis* recorded from the Pacific Ocean. The shape of the hydrothecae, their approximation, and the relatively great size of the nematophores are characteristic of the species.

ACANTHELLA EFFUSA (Busk)

Plate 45, figs. 1, 2

Plumularia effusa BUSK, Voyage of the *Rattlesnake*, 1852, vol. 1, p. 400.

Plumularia effusa KIRCHENPAUER, Ueber die Hydroidenfamilie, Plumulariadae, pt. 2, 1876, p. 46, pl. 1, fig. 4.

Acanthella effusa ALLMAN, Hydroids of the Challenger, pt. 1, 1883, p. 27, pl. 6.

This remarkable species is represented by several fine specimens in the collection under consideration, and fortunately the gonosome, hitherto unknown, is included. Allman's description is accurate and fairly complete, but the following items may be added:

Trophosome.—Stem and main branches not fascicled, the lower part of the former not bearing hydrocladia but beset with four regular rows of stubby, thornlike processes which bear nematophores, often in pairs, and are of the usual eleutheroplean type. (Allman represents these as sharp thorns in his figure.) The stem is also divided into regular internodes. The distal branchlets bear thornlike processes as described by Allman. The hydrocladia are quite dense, divided into regular internodes, each bearing a hydrotheca. Hydrocladial internodes with usually three strong internal thickenings back of the hydrotheca. Hydrotheca typically pitcher-shaped as described by Allman.

Gonosome.—(Hitherto unknown.) Gonangia borne on branches at bases of hydrocladia where they form a double row on one side of the branch. They are small, triangular in outline, shaped like flattened cones. They are not protected by specialized branches in the form of phylactogonia.

Localities.—Dredging station 5139, vicinity of Jolo, Jolo Light, 6° 6' N., 120° 2' 30' E.; depth, 20 fathoms. Station 5141, vicinity of Jolo, Jolo Light, 6° 9' N., 120° 58' E.; depth, 29 fathoms. Station 5146, Sulu Archipelago, vicinity of Sulade Island, 5° 46' 40'' N., 120° 48' 50'' E.; depth, 24 fathoms. Station 5149, Sulu Archipelago, vicinity of Sirun Island, 5° 33' N., 120° 42' 10'' E.; depth, 10 fathoms. Station 5174, vicinity of Jolo, Jolo Light, 6° 3' 45'' N., 120° 57' E.; depth, 20 fathoms. Station 5484, between Samar and Leyte, vicinity of Surigao Strait, Cabugan Grande Island, 10° 28' N., 125° 20'' E.; depth, 76 fathoms. Station 5557, Jolo Island and vicinity, Cabalian Point, 5° 51' 30'' N., 121° 1' E.; depth, 13 fathoms.

Distribution.—Torres Strait (Busk), Philippines (Kirchenpauer), reefs off Zamboanga (Allman).

This is one of the most striking species of plumularians that the writer has ever seen, and the graceful, pitcher-shaped hydrothecae are unique in form. So far as I know, this species has not been seen

since the *Challenger* expedition secured it and Allman reported on it in 1883.

STECHOWIA, new genus

Branches scattered over the hydrocaulus and bearing hydrocladia, each of which bears a single hydrotheca beyond which the hydrocladium is produced into a long, slender process bearing nematophores. This genus combines the scattered branches of *Antennopsis* and the hydrocladia bearing a single hydrotheca, as in the genus *Monotheca*. The unique character, however, is the extension of the hydrocladium far beyond the hydrotheca as a free nematophorous process.

I take pleasure in naming this very distinct genus after my friend, Dr. E. Stechow, of Munich, an outstanding authority on the Hydroida.

Genotype.—*Stechowia armata*, new species.

STECHOWIA ARMATA, new species

Plate 46, figs. 1, 2

Trophosome.—Colony $1\frac{1}{2}$ cm. in height and 8 mm. in spread; main stem unfasciated, straight, not definitely divided into internodes; branches alternate on basal part and scattered over the distal portion, divided into regular internodes, each of which bears a hydrocladium and irregularly distributed nematophores. Hydrocladia alternate, borne on shoulders from the distal end of each internode of the branch and bearing a single hydrotheca, beyond which the hydrocladium is produced into a slender, tendril-like process which is divided into irregular internodes, each of which, as a rule, bears a single nematophore. These extensions of the hydrocladia are often several times the length of the hydrotheca. Hydrothecae bell shaped with flattened margin, wider than deep, borne on the second internode of each hydrocladium. Nematophores, a supracalyx pair inserted distinctly above each hydrotheca, a mesial one distinctly below the case of each hydrotheca, and a cauline nematophore on the proximal nonhydrothecate internode of each hydrocladium. There is also a nematophore on each joint of the process extending beyond each hydrotheca and often a pair at the distal end of this process. Cauline nematophores are also found in the axil of each hydrocladium, one on each internode of the branches which bear the hydrocladia, and a number scattered over the main stem.

Gonosome.—Gonangia borne on the proximal parts of the branches, oblong-ovate in form, with their distal ends abruptly truncated. The contents indicate that the colony described is male.

This species bears a superficial resemblance to *Calvinia mirabilis* Nutting,²⁶ in which the mesial nematophore of each hydrotheca is

²⁶ American Hydroids, pt. 1, The Plumularidae, 1900, p. 77.

produced into a nematophorous branch somewhat resembling the one described above. In that species, however, there are a number of hydrothecae borne on each hydrocladium, and the nematophorous branch replaces a greatly modified mesial nematophore, while in the present species the nematophorous branch is a continuation of the hydrocladium itself.

Type locality.—Davao Bay, Gulf of Davao, growing on a pearl oyster, May 18, 1908.

Holotype.—Cat. No. 42184, U.S.N.M.

As this hydroid was found on a pearl oyster shell, it came from relatively shallow water, probably from a depth not greater than 25 fathoms.

AGLAOPHENIA MACGILLIVRAYI (Busk)

Plumularia macgillivrayi BUSK, Voyage of the *Rattlesnake*, 1852, vol. 1, p. 400.

Aglaophenia macgillivrayi KIRCHENPAUER, Ueber die Hydroidenfamilie Plumularidae, 1872, p. 27.

(?) *Aglaophenia cupressina* LAMOUREUX, Histoire des Polypiers Coralligènes, 1816, p. 169.

Allman²⁷ has given such a complete description and excellent figures of this species that further treatment seems unnecessary. The great size of the mesial nematophores and the small size of the hydrothecae as compared with the thickness of the hydrocladia are characteristic features. The gonosome was a corbula entirely in conformity with the true *Aglaophenia* type.

Localities.—From Nogas Point, Panay, beach. Dredging station 5321, China Sea, vicinity of Formosa, Ibugos Island, 20° 19' 30" N., 121° 51' 15" E.; depth, 26 fathoms. Dredging station 5559, Jolo Island and vicinity at Cabalian Point, 5° 51' 36" N., 121° 0' 45" E.; depth 13 fathoms. Tonquil Island, Gumila Reef, depth not given. Sabtan Island, November 8, 1908. Cataingan Bay, Dumurug Point, April 18, 1908.

Distribution.—Louisiade Archipelago, Australia (Busk); Simons Bay, Cape of Good Hope (Allman); near Mindanao, Philippines (Hargitt).

This remarkable form has very large nematophores and nematocysts which can be seen in the specimens secured, their threads extending in bundles from the apertures of the nematophores.

AGLAOPHENIA CALYCIFERA Bale

Aglaophenia calycifera BALE, Report on the Hydroids collected in the Great Australian Bight, etc., pt. 2, 1914, p. 178, pl. 37, figs. 3 and 4.

A fragmentary specimen is referred with some doubt to this form. The gonosome is absent.

²⁷ Challenger Reports, The Hydroids, pt. 1, 1883, p. 34, pls. 10 and 20, figs. 4-6.

Locality.—Dredging station 5132, Sulu Sea, off western Mindanao, island off Panabutan Point, N. 15° W., 0.30 mile; depth, 26 fathoms.

Distribution.—Great Australian Bight (Bale), longitude 130° 41' E.; 160 fathoms; longitude 126° 45½' E.: 190–320 fathoms.

AGLAOPHENIA URENS Kirchenpauer

Aglaophenia urens KIRCHENPAUER, Ueber die Hydroidenfamilie Plumularidae, 1872, p. 46, pl. 1, fig. 27.

The specimens secured by the *Albatross* on her Philippine cruise agree quite closely with the description and figures given by Kirchenpauer, and I have no doubt regarding the identity of the form.

Locality.—Dredging station 5157, Sulu Archipelago, Tawi Tawi group, Tinakta Island, 5° 12' 30'' N., 119° 55' 50'' E.; depth, 18 fathoms.

Distribution.—Java and Singapore (Kirchenpauer); Australia, Port Stephens and Port Denison (Haswell, according to Bale). This very well marked species has not hitherto been reported from the Philippine region.

AGLAOPHENIA DIVARICATA (Busk)

Plumularia divaricata BUSK, Voyage of Rattlesnake, 1852, vol. 1, p. 398.

Aglaophenia ramosa KIRCHENPAUER (not Busk). Ueber die Hydroidenfamilie Plumularidae, 1872, p. 38, pls. 1 and 2, fig. 17.

Aglaophenia divaricata BALE, Australian Hydroid Zoophytes, 1884, p. 162, pl. 15, figs. 7 and 8.

(?) *Aglaophenia mecoyi* BALE, Journ. Microscop. Soc. Victoria, 1881, p. 24.

The specimens before me agree very closely with the descriptions and figures of this species given by Bale. In habit of growth, however, there is very wide divergence, our specimens consisting of a number of slender, unbranched, upright stems, all apparently growing from a common creeping root stalk. In the absence of the gonosome, the present writer does not feel justified in separating this form under a new name.

Locality.—Dredging station 5248, Gulf of Davao, Lanang Point, 7° 7' 25'' N., 125° 40' 24'' E.; depth, 18 fathoms.

Distribution.—Bass Strait (Busk), several Australian localities, i. e., Brighton, Wilsons Promontory, Port Jackson, Queens Cliff, Williamstown (Bale), also Georgetown (Tasmania).

AGLAOPHENIA TRIRAMOSIA, new species

Plate 46, figs. 3, 4

Trophosome.—Colony plumosely branched, 16 cm. high and with a spread of about 6 cm. Main stem fascicled, main branches all on one side and each branch again branching into three branchlets which bear the hydrocladia. (Hence the name *triramosa*.) The main stem

also bears hydrocladia, but has no evident nodes. Branches fascicled basally, simple distally, and without evident internodes. Hydrocladia springing from one side of the branchlets, alternate, growing at a rather sharp angle from the branchlet; divided into regular internodes each bearing a hydrotheca. Hydrothecae separated by about one-fifth of their height, deep, subcylindrical, margin somewhat everted and without teeth except a small but evident one in front. The lateral parts of the margin are undulatory, but without definite teeth. There is a small chitinous interior strap in each internode below the supracalcine nematophores and another near the bottom of each hydrotheca. Nematophores—supracalcine nematophores rather large, their openings rising above the top of the hydrotheca and their margins cut away on the adcauline side. Mesial nematophores are stout and their margins do not quite attain the height of the middle of the hydrotheca. Their outer profile is quite straight. Cauline nematophores in a row on the main stem opposite the side from which the branches spring, there is also a row of hydrothecae scattered among these nematophores.

Gonosome.—Gonangia borne in closed corbulae which are modified hydrocladia borne on the branchlets. They are about 8 mm. long and 1½ mm. in width, tapering gradually distally, composed of about 16 pairs of corbula leaves, most of which meet above although the distal ones do not. There are no hydrothecae at the bases of the corbula leaves, but there is a large nematophore at each leaf base. The rest of the nematophores are very minute and inconspicuous, there being a row of six or eight on the edge of each leaf. There are usually two or three hydrothecae on the hydrocladium between the corbula and branch from which it arises.

Localities.—Dredging station 5310, China Sea, vicinity of Hongkong, 21° 33' N., 116° 13' E.; depth, 100 fathoms. Station 5311, China Sea, vicinity of Hongkong, 21° 33' N., 116° 15' E.; depth, 88 fathoms. Station 5312, China Sea, vicinity of Hongkong, 21° 30' N., 116° 32' E.; depth, 140 fathoms.

The peculiar manner of branching and the extremely minute nematophores on the corbulae are good diagnostic features of this species,

Holotype.—Cat. No. 42189, U. S. N. M.

LYTOCARPUS PHOENICEUS (Busk)

Plumularia phoenicca BUSK, Voyage of the Rattlesnake, 1852, vol. 1, p. 398.

Aglaophenia phoeniceus BALE, Australian Hydroid Zoophytes, 1884, p. 159, pl. 17, figs. 1-4; pl. 19, fig. 31.

Lytocarpus phoeniceus BALE, The Genera of the Plumularidae, etc., 1887, p. 15.

The specimens collected on the Philippine cruise of the *Albatross* agree very exactly with the detailed description and excellent figures

given by Bale in his Australian Hydroid Zoophytes, both as to the trophosome and gonosome, excepting that the hydrothecal margins are more strongly dentate than is represented by him; but occasional hydrothecae have teeth reduced to the extent represented in some of Bale's figures.

The gonosome is almost identical with that of *Lytocarpus hawaiiensis* Nutting.²⁸ But the hydrothecae are quite different in form.

Localities.—Dredging station 5249, Gulf of Davao, Lanang Point, 7° 6' 6'' N., 125° 40' 8'' E.; depth, 23 fathoms. Station 5321, China Sea, vicinity of Formosa, Ibugos Island, 20° 19' 30'' N., 121° 51' 15'' E.; depth, 26 fathoms. Station 5642, Buton Straits, Tikola Peninsula, 4° 31' 40'' S., 122° 49' 42'' E.; depth, 37 fathoms.

The specimen from station 5249 has hydrothecae which agree quite exactly with the figures given by Bale; therefore the species appears to be correctly identified.

Distribution.—Australia, Prince of Wales Channel (Busk); various Australian points (Bale); Singapore (Kirchenpauer); Amoy Island (Swoboda); Japan (Arrotz); Indian Ocean (Swoboda); Sagami Sea, Japan (Inaba); Hawaiian Islands (Nutting).

LYTOCARPUS SPECTABILIS Allman

Lytocarpus spectabilis ALLMAN, Report on Hydroida of the Challenger Expedition, pt. 1, 1883, p. 43, pl. 15.

The trophosome only is found in our specimens, but it agrees quite exactly with Allman's description and figures.

Locality.—Dredging station 5150, Sulu Archipelago, vicinity of Siasi, Sirun Island, 5° 23' 20'' N., 120° 35' 45'' E.; depth, 21 fathoms.

Distribution.—The types were taken by the *Challenger* from Zamboanga, Philippines, and Torres Strait (Allman). So far as I know, this species has not been reported since its original discovery by Allman.

LYTOCARPUS PENNARIUS (Linnaeus)

Sertularia pennaria LINNAEUS, Systema Natura, 1758, p. 813.

Lytocarpus secundus ALLMAN, Challenger Reports, the Hydroids, Part 1, The Plumularidae, 1883, p. 42.

Agtaophenia (Lytocarpia) secunda KIRCHENPAUER, Ueber die Hydroidenfamilie Plumularidae, 1872, p. 35.

Lytocarpus hawaiiensis NUTTING, Hydroids of the Hawaiian Islands, 1905, p. 954.

Lytocarpus pennarius RITCHIE, Hydroids of the Indian Museum, 1910, p. 19.

This appears to be an exceedingly variable species, particularly in the shape of the hydrothecae. In the specimen at hand, individual hydrothecae can be found to match the drawings of this form made

²⁸ Hydroids of the Hawaiian Islands, 1905, p. 945, pl. 12, fig. 12.

by Kirchenpauer, Allman, Ritchie, and the present writer. It therefore seems proper to adopt the opinion of Ritchie and regard the species of Linnaeus, Kirchenpauer, Allman, and Ritchie as identical, and to these should be added my own *L. hawaiiensis* with the type of which I have compared the specimen under consideration. All of these show a gonosome of peculiar type consisting of curved phylactogonia, beset with a double row of opposite nematophores. The gonangia are ovoid sacs borne at the bases of the phylactogonia.

Localities.—Dredging station 5146, Sulu Archipelago, vicinity of Siasi, Sulade Island, $5^{\circ} 46' 40''$ N., $120^{\circ} 48' 50''$ E.; depth, 24 fathoms. Station 5302, China Sea, vicinity of Hongkong, $21^{\circ} 42' N.$, $114^{\circ} 50' E.$; depth, 38 fathoms. Station 5303, China Sea, vicinity of Hongkong, $21^{\circ} 44' N.$, $114^{\circ} 48' E.$; depth, 34 fathoms. Station 5304, China Sea, vicinity of Hongkong, $21^{\circ} 46' N.$, $114^{\circ} 47' E.$; depth, 34 fathoms. Station 5305, China Sea, vicinity of Hongkong, $21^{\circ} 54' N.$, $114^{\circ} 46' E.$; depth, 37 fathoms. Station 5332, Mindoro Strait, at Apo Light, $12^{\circ} 47' 15'' N.$, $120^{\circ} 41' E.$; depth, 745 fathoms. Station 5338, Palawan Passage, Observatory Island, $11^{\circ} 33' 45'' N.$, $119^{\circ} 24' 45'' E.$; depth, 43 fathoms. Station 5342, Malampaya Sound, Palawan Island, Endeavor Point, $10^{\circ} 56' 55'' N.$, $119^{\circ} 17' 24'' E.$; depth, 14 to 25 fathoms. Station 5355, North Balabac Strait, at Balabac Light, $8^{\circ} 8' 10'' N.$, $117^{\circ} 19' 15'' E.$; depth, 44 fathoms. Station 5358, Jolo Sea, Sandakan Light, $6^{\circ} 6' 40'' N.$, $118^{\circ} 18' 15'' E.$; depth, 39 fathoms. Station 5399, North of Cebu, Tanguingui Island, $11^{\circ} 21' 45'' N.$, $124^{\circ} 5' E.$; depth, 32 fathoms. Station 5432, Eastern Palawan and vicinity, Corandagos Island, $10^{\circ} 37' 50'' N.$, $120^{\circ} 12' E.$; depth, 51 fathoms.

Distribution.—Hawaiian Islands (Nutting); South Sea, China and Pelew Islands (Kirchenpauer); Philippine Islands (Allman); Singapore (Marktanner-Turneretscher); Indian waters (Ritchie).

LYTOCARPUS PHILIPPINUS (Kirchenpauer)

Aglaophenia philippina KIRCHENPAUER, Ueber die Hydroidenfamilie Plumularidae, 1872, pt. 1, p. 45.

Aglaophenia urens BALE, Australian Hydroid Zoophytes, 1884, p. 155.

Lytocarpus philippinus BALE, Proceedings Linn. Soc. New South Wales, vol. 3, ser. 2, 1888, p. 786.

This well-known species was secured by the *Albatross* at station 5251, Gulf of Davao, Linao Point, $7^{\circ} 5' 12'' N.$, $125^{\circ} 39' 35'' E.$; depth 20 fathoms; and at station 5254, same general locality, $7^{\circ} 5' 42'' N.$, $125^{\circ} 39' 42'' E.$; depth, 21 fathoms. Station 5153, Sulu Archipelago, Tawi Tawi group, Tocanhi Point, $5^{\circ} 18' 10'' N.$, $120^{\circ} 2' 55'' E.$; depth, 49 fathoms. Station 5165, Sulu Archipelago, Tawi Tawi group, Observation Island, $4^{\circ} 58' 20'' N.$, $119^{\circ} 50' 30'' E.$; depth, 9 fathoms.

Distribution.—Philippine Islands (Kirchenpauer and Hargitt); Queensland, Australia (Bale); Red Sea (Frauenfeld); Mediterranean (Kattegat); Jamaica, British West Indies, and Panama (Nutting); Bahia, Brazil (Rathbun).

LYTOCARPUS BALEI Nutting

Lytocarpus balei NUTTING, Hydroids of the Hawaiian Islands, 1905, p. 954, pl. 13, figs. 7 and 8.

The specimens secured by the *Albatross* agree fairly well with the type specimen of this species and show the strong septal ridges in the hydrocladia. The *Albatross* material, however, differs in having relatively longer longer supracalycine nematophores. The gonosome is not present.

Localities.—Station 5141, Sulu Archipelago, vicinity of Jolo, Jolo Light, 6° 9' N., 120° 58' E.; depth, 29 fathoms. Station 5147, Sulu Archipelago, vicinity of Sulade Island, 5° 41' 40'' N., 120° 47' 10'' E.; depth, 21 fathoms. Station 5149, Sulu Archipelago, vicinity of Sirun Island, 5° 33' N., 120° 42' 10'' E.; depth, 10 fathoms. Station 5150, Sulu Archipelago, vicinity of Sirun Island, 5° 23' 20'' N., 120° 35' 45'' E.; depth, 21 fathoms.

Distribution.—Hawaiian Islands, off south coast of Molokai, 47–115 fathoms (Nutting).

Genus THECOCARPUS Nutting

Stechow in 1920 relegates the genus *Thecocarpus* to synonymy and replaces it with *Lytocarpia* of Kirchenpauer (1872). But Bedot (1921) rejects Stechow's arguments and reaffirms the validity of *Thecocarpus* Nutting. The present writer believes that the position of Bedot is the stronger and had written out a defense of the genus *Thecocarpus* before Bedot's work came to hand, but prefers to allow the validity of the genus to be maintained by Bedot.

THECOCARPUS BALEI, new species

Plate 47, figs. 1, 2

Trophosome.—Colony plumose, specimen unbranched, 10 cm. high and with a spread of 4 cm., fascicled almost to tip, straight, without evident internodes. Hydrocladia alternate, close-set, borne on one side of the stem, all springing from the same tube (hydrocladiate tube) of the fascicled stem, divided into regular nodes by oblique internodes, each of which bears a hydrotheca. Hydrothecae cup-shaped, rather small for this genus, about one and one-quarter as deep as wide; margin slightly everted, somewhat undulating on the sides, but without evident teeth except a median anterior one which

is small but plainly seen. Nematophores, mesial nematophores are large for this genus, not attaining the level of the margin of the hydrotheca, margin finely crenulated and incomplete behind, where the nematophore appears to be obliquely beveled. Supracalyceine nematophores just about reaching the level of the hydrothecal rim, projecting outward rather than upward and with a broad everted margin somewhat like the lip of a pitcher. Cauline nematophores are borne on the hydrocladial tube of the stem.

Gonosome.—The gonangia are inclosed in a corbula in which the leaves are united as in the genus *Aglaophenia*, but there is a hydrotheca at the base of each leaf as is characteristic of *Thecocarpus*. The corbula is extraordinarily long and slender (10 mm. long and 1 mm. in diameter) composed of about 24 pairs of leaves, each with a hydrotheca at its base and bearing a row of six to eight nematophores on its edge. Nematophores tubular with the margin having a deep sinus or bay cut away on one side. These corbulae are really modified hydrocladia having two or three normal hydrothecae on the proximal part between the stem and corbula.

Localities.—Dredging station 5134, Sulu Archipelago, Balukbaluk Island, 6° 44' 45" N., 121° 48' E.; depth, 25 fathoms. Station 5335, Linapacan Strait, Observatory Island, 11° 37' 15" N., 119° 48' 45" E.; depth, 46 fathoms.

Holotype.—Cat. No. 42185, U.S.N.M.

The writer takes pleasure in naming this species after the veteran Australian naturalist and authority on the Hydroida, W. N. Bale. This species is nearest *Aglaophenia calycifera* Bale but is without the cap-like sarcothecae which Bale regards as a diagnostic feature.²⁹

HALICORNARIA HIANIS (Busk)

Plumularia hians BUSK, Voyage of the Rattlesnake, 1852, vol. 1, p. 396.

Halicornaria hians BALE, Australian Hydroid Zoophytes, 1884, p. 179.

Our specimens correspond quite closely with the figures and description given by Bale.

Locality.—Dredging station 5321, China Sea, vicinity of Formosa, Ibugos Island, 20° 19' 30" N., 121° 51' 15" E.; depth, 26 fathoms.

Distribution.—Prince of Wales Channel, Torres Strait (Busk); Sagami Sea, Japan (Inaba, according to Stechow).

HALICORNARIA TENUIROSTRIS, new species

Plate 47, figs. 3, 4

Trophosome.—Colony plumose, 11 cm. high and with a spread of 4 cm. Stem not fascicled, divided into irregular internodes, giving off alternate closely approximated hydrocladia. The nodes are

²⁹ Hydroids collected in the Great Australian Bight, pt. 2, 1914, p. 178.

more distinct on the distal than on the proximal parts; but divide internodes of irregular length. Hydrocladia springing from the front of the main stem, but inclined alternately to right and left and are divided into internodes by indistinct nodes, each internode of the main stem bearing a hydrocladium. Hydrothecae cup-shaped, one and one-half times as long as wide, distal part bent somewhat outward and the aperture opening at an angle of about 45° with the axis of the hydrocladium. Marginal teeth vary considerably, but are often more prominent than is usual in this genus, there being two lobe-like or bluntly pointed lateral teeth and a sharply pointed median or front tooth. The anterior intrathecal ridge characteristic of this genus is well marked and proceeds from a strong indentation about half way up the front of the hydrotheca, showing in profile as a doubly curved line reaching more than half way across the hydrotheca. Nematophores, supracalycine nematophores roughly triangular in outline, their tops not nearly reaching the level of the top of the hydrotheca and aperture round. Mesial nematophores very narrow, tubular, closely adherent to the front of the hydrotheca almost or quite throughout their length and not reaching the top of the hydrotheca. Their front profile is straight or with a slight double curve. There is a partial septum opposite the intrathecal ridge.

Gonosome.—Not present.

Locality.—Dredging station 5251, Gulf of Davao. Linao Point. $7^\circ 5' 12''$ N., $125^\circ 39' 35''$ E.; depth, 20 fathoms.

Holotype.—Cat. No. 42186, U.S.N.M.

This species is nearest my *Halicornaria flava* from Hawaiian waters or *H. ishikawai* Stechow from which it differs in the prominence of the hydrothecal teeth and the slenderness of the mesial nematophores as well as in certain characters of the stem.

(?)**HALICORNARIA MAGNIROSTRIS**, new species

Plate 47, figs. 5, 6

Trophosome.—Colony an aggregation of pinnate stems growing from a creeping root stalk, stem fascicled, hydrocladia alternate, very closely approximated and set on opposite sides of the branch or stem from which they spring; divided into regular hydrothecate internodes and showing intercladial ridges just above the mesial nematophores and two others, one above and one below the supracalycine pair. Hydrothecae of the usual *Halicornaria* type with an interior intrathecal ridge and a sharp bay or sinus on its front margin just above where the mesial nematophore becomes free; margin with a rather sharp anterior tooth and two lateral lobular teeth, the hindmost being partially hidden by the supracalycine nematophore.

The intrathecal ridge is short but strong. Nematophores, the supracalcine pair are large blunt thumblike in form with a terminal orifice pointing upward and rising slightly above the hydrothecal rim. Mesial nematophores enormous, almost equal to the hydrotheca in diameter and reaching far beyond the hydrothecal margin. They are free from the front of the hydrotheca above the intrathecal ridge and sometimes this free portion equals the entire hydrotheca in length. There is a small round opening from the nematophore into the hydrotheca below the intrathecal ridge and another on the distal end of the nematophore. The nematocysts borne by these mesial nematophores are very long and narrow and a bundle of their very complex threads is often seen projecting from the distal opening of the nematophore. There is a very large nematophore resembling the mesial ones near the base of each hydrocladium between the first and second hydrothecae but projecting from the side of the hydrocladium end at a right angle to the axis of the ordinary mesial nematophore. Indeed, it looks like a misplaced mesial nematophore although more nearly in the position of the supracalcine nematophores.

Gonosome.—Not present.

Localities.—Dredging station 5139, vicinity of Jolo, Jolo Light, 6° 6' N., 121° 2' 30'' E.; depth, 20 fathoms. Station 5165, Sulu Archipelago, Tawi Tawi group, Observation Island, 4° 58' 20'' N., 119° 50' 30'' E.; depth, 9 fathoms.

Holotype.—Cat. No. 42187, U.S.N.M.

The propriety of placing this extraordinary form in the genus *Halicornaria* is doubtful. Indeed, in the absence of the gonosome it is almost impossible to distinguish that genus from *Lytocarpus*.

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EXPLANATION OF PLATES

PLATE 40

- FIG. 1. *Stegopoma dimorpha*. Hydrothecae (enlarged).
 2. *Stegopoma dimorpha*. Small type of gonangium (enlarged).
 3. *Stegopoma dimorpha*. Large type of gonangium (enlarged).
 4. *Hebella spiralis*. Part of colony (enlarged).
 5. *Hebella spiralis*. Hydrotheca (enlarged).
 6. *Hebella spiralis*. Hydrotheca (enlarged).

PLATE 41

- FIG. 1. *Acryptolaria normani*. Hydrothecae (greatly enlarged).
 2. *Acryptolaria normani*. Hydrothecae (enlarged).
 3. *Zygophylax curvitheca*. Gonangia (enlarged).
 4. *Dictyocladium aberrans*. Hydrothecae (enlarged).
 5. *Dictyocladium aberrans*. Gonangium (enlarged).

PLATE 42

- FIG. 1. *Sertularella cornuta* Stechow. Hydrothecae (enlarged).
 2. *Sertularella cornuta* Stechow. Gonangia (enlarged).
 3. *Sertularella mirabilis* Jäderholm. Gonangium (enlarged).
 4. *Sertularella mirabilis* Jäderholm. Gonangium (greatly enlarged).
 5. *Diphasia heurteli* Billard. Hydrothecae (enlarged).
 6. *Diphasia heurteli* Billard. Gonangium, side view (enlarged).
 7. *Diphasia heurteli* Billard. Gonangium, front view (enlarged).

PLATE 43

- FIG. 1. *Diphasia inornata*. Hydrothecae and gonangium (enlarged).
 2. *Plumularia aglaophenoides* Bale. Hydrothecae (enlarged). (After Bale).
 3. *Plumularia aglaophenoides* Bale. Gonangium (greatly enlarged).
 4. *Plumularia flabellata*. Hydrothecae (enlarged).
 5. *Plumularia flabellata*. Hydrothecae (greatly enlarged).

PLATE 44

- FIG. 1. *Plumularia hargitti*. Hydrothecae (enlarged).
 2. *Plumularia hargitti*. Gonangium (enlarged).
 3. *Plumularia camarata*. Part of branch (enlarged).
 4. *Plumularia camarata*. Three hydrothecae (greatly enlarged).
 5. *Antennella biarmata*. Hydrothecae (enlarged).
 6. *Antennella recta*. Hydrotheca (greatly enlarged).
 7. *Antennella recta*. Hydrothecae (enlarged).

PLATE 45

- FIG. 1. *Acanthella effusa* (Busk). Gonangia (enlarged).
 2. *Acanthella effusa* (Busk). Gonangia (greatly enlarged).
 3. *Antennopsis pacifica*. Part of branch (enlarged).
 4. *Antennopsis pacifica*. Hydrotheca (greatly enlarged).

PLATE 46

- FIG. 1. *Stechowia armata*. Part of branch with gonangia (enlarged).
2. *Stechowia armata*. Hydrotheca (greatly enlarged).
3. *Aglaophenia triramosa*. Hydrotheca (greatly enlarged).
4. *Aglaophenia triramosa*. Corbula (enlarged).

PLATE 47

- FIG. 1. *Thecocarpus balei*. Two hydrothecae (greatly enlarged).
2. *Thecocarpus balei*. Corbula (enlarged).
3. *Halicornaria tenuirostris*. Part of hydrocladium (enlarged).
4. *Halicornaria tenuirostris*. Two hydrothecae (greatly enlarged).
5. *Halicornaria magnirostris*. Two hydrothecae (greatly enlarged).
6. *Halicornaria magnirostris*. Hydrothecae to show giant nematophores (enlarged).

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